Streamflow in the New York Part of the Susquehanna River Basin

BULLETIN 71
1975

Prepared by
United States Department of the Interior
Geological Survey
in cooperation with
New York State Department of Environmental Conservation

STREAMFLOW IN THE NEW YORK PART OF THE SUSQUEHANNA RIVER BASIN

By

Henry F. H. Ku,
Allan D. Randall,
and
Robert D. MacNish

U.S. Geological Survey

Prepared by
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

in cooperation with
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Bulletin 71
1975

STATE OF NEW YORK

Hugh L. Carey ....Governor

Department of Environmental Conservation

Ogden Reid ....Commissioner

Office of Program Development, Planning and Research

Thomas P. Eichler ....Director
John A. Finck ....Assistant Director for Plan Development

UNITED STATES DEPARTMENT OF THE INTERIOR

Rogers C. B. Morton ....Secretary

Geological Survey

V. E. McKelvey ....Director
Joseph S. Cragwall, Jr. ....Chief Hydrologist
Joseph T. Callahan ....Regional Hydrologist
Robert J. Dingman ....District Chief

CONTENTS

ILLUSTRATIONS

TABLES

(Tables 1-9 are for the entire New York part of the Susquehanna River basin)

CONVERSION FACTORS AND ABBREVIATIONS

The following factors may be used to convert the conventional (English) units of measurement in this report to the International System of Units (metric system).

Multiply	by	To obtain
acre-feet (acre-ft)	0.001233	cubic hectometers (hm^3)
cubic feet per second (cfs)	28.32	liters per second (l/s)
	.02832	cubic meters per second (m^3/s)
cubic feet per second - days	2,447	cubic meters (m^3)
	.002447	cubic hectometers (hm^3)
cubic feet per second per square mile (cfsm)	10.93	liters per second per square kilometer [$(l/s)/km^2$]
cubic miles (cu mi)	4.17	cubic kilometers (km^3)
feet (ft)	.3048	meters (m)
gallons per minute (gpm)	.0631	liters per second (l/s)
inches (in.)	25.4	millimeters (mm)
	2.54	centimeters (cm)
miles (mi)	1.609	kilometers (km)
square miles (sq mi)	2.590	square kilometers (km^2)

Other abbreviations used in this report include:

creek (Cr)
river (R)
hours (hrs)
milligrams per liter (mg/l)
degrees [latitude and longitude] (°)
minutes [latitude and longitude] (')
seconds [latitude and longitude] ('')
degrees Celsius [temperature] (°C)
degrees Fahrenheit [temperature] (°F) Note: °C = 5/9 (°F-32)

STREAMFLOW IN THE NEW YORK PART OF THE SUSQUEHANNA RIVER BASIN

By

Henry F. H. Ku,
Allan D. Randall,
and
Robert D. MacNish

ABSTRACT

The Susquehanna River basin occupies about 6,500 square miles (17,000 square kilometers) in south-central New York. Continuous records of streamflow at 60 gaging stations are summarized by tables of flow duration and low-flow frequency for the 1931-60 standard period and (or) for periods of record through 1959 and 1967. Similar statistics are developed by correlation for 110 partial-record stations. Record low flows for one or more periods were set at 26 of 37 long-term gaging stations during the drought of the 1960's, and the cumulative runoff deficiency equaled $1\frac{1}{2}$ years of normal runoff.

Sand and gravel, abundant along most major valleys, temporarily store enough water to reduce the variability of flow and to sustain low flows. Equations based on mean runoff and percentage area of sand and gravel may be used to estimate low flows. Streams lose water wherever they leave their own valleys and cross the sand-and-gravel fill of a larger valley. Losses commonly exceed 0.5 cubic foot per second in 1,000 feet (14 liters per second in 300 meters).

Maps of annual precipitation and runoff show that precipitation is several inches greater in the eastern part of the basin than in the western part, but evapotranspiration is slightly greater in the west. Requirements for within-year and carryover storage with 2- to 10-percent risks of deficiency are presented for gaged sites and may be estimated for ungaged sites from low-flow and mean-runoff parameters. Flood magnitude and frequency at gaging stations are summarized, and three regions are defined within which floods on major streams have a consistent relation to basin size.

The principal factor influencing chemical quality of streamflow is limestone content of glacial drift, which is much greater in many major valleys than in nearby uplands and which decreases southward. Quality of precipitation seems uniform basin-wide, but the higher ratio of evapotranspiration to precipitation in the western part enriches the dissolved-solids concentration of runoff. Man's activities probably add considerable chloride locally, especially in the western part of the basin. On the upland hillsides, which cover most of the basin, storm runoff and shallow ground-water discharge have similar chemical quality.

Monthly mean temperatures as high as 77° Fahrenheit (25° Celsius) are likely in large rivers at low altitudes in the southern part of the basin, especially in reaches bordered by little surficial sand and gravel.

INTRODUCTION

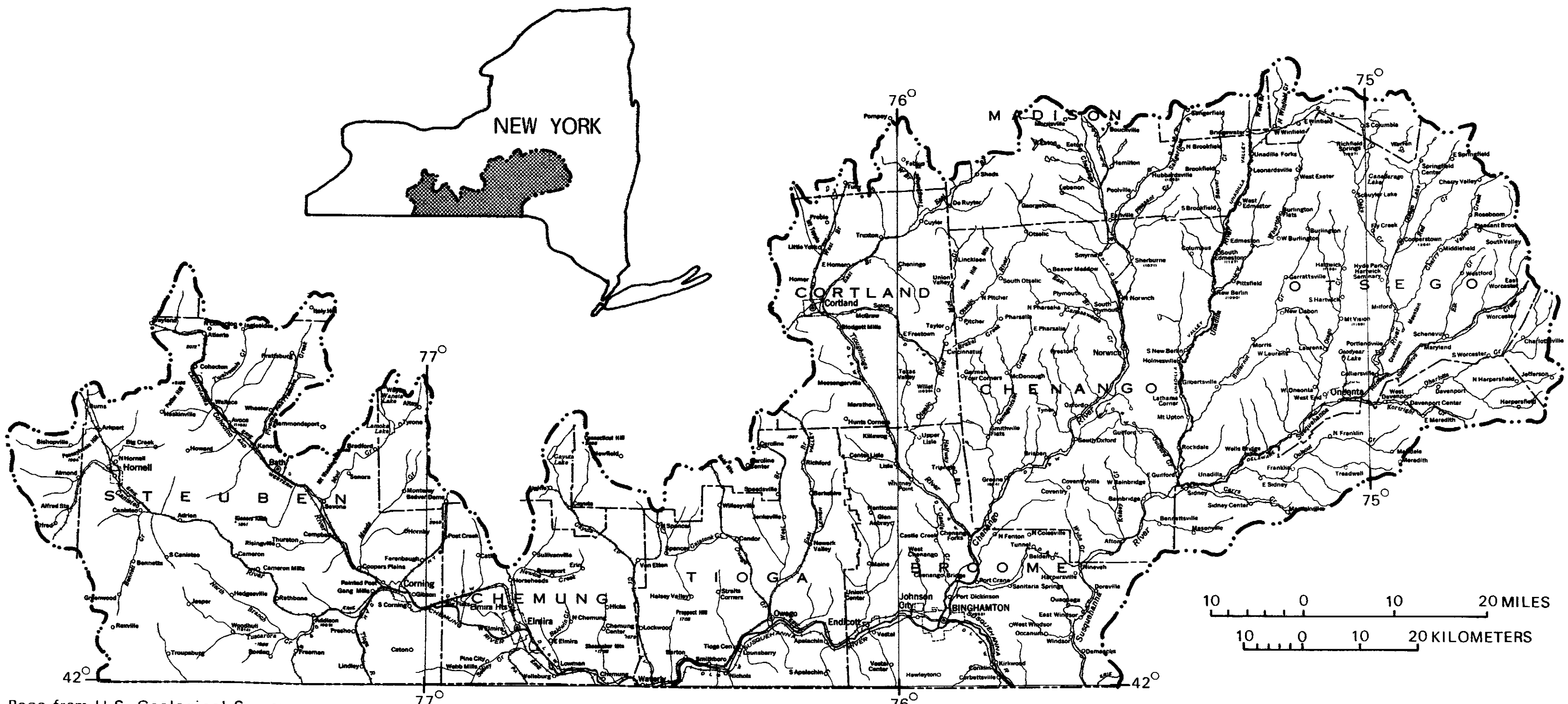
The Susquehanna River basin occupies about 6,500 square miles (17,000 square kilometers) in south-central New York (fig. 1). Average annual precipitation on the basin amounts to approximately 3.8 cubic miles (16 cubic kilometers) of water. Of this amount, approximately 2.1 cubic miles (8.8 cubic kilometers) flows out of New York in the Susquehanna River and its tributary the Chemung River, which join in Pennsylvania a few miles south of the State line. Virtually all the remaining 1.7 cubic miles (7.1 cubic kilometers) of water either is used by plants, animals, and people in the basin or is evaporated from the land surface and from lakes and streams. An insignificant amount of water seeps out of the basin below the earth's surface. The water that leaves the basin annually as streamflow is the primary concern of this report.

The Susquehanna River basin in New York has been experiencing an increase in population, an expansion of industry, and changes in agricultural technology. All these changes have been accompanied by a steady increase in the demand for water. Fortunately, this basin is blessed with ample water resources. The 2.1 cubic miles (8.8 cubic kilometers) of water flowing through and out of the basin in an average year could probably supply the needs of 28 million people (more than 40 times the 1970 population of the basin), assuming that all waste water were given advanced waste treatment and were recycled wherever possible and that consumptive use were 10 percent per usage cycle (MacNish and others, 1969).

The major water problem in the Susquehanna River basin is the distribution of water in time and space. Droughts cause water shortages in areas where adequate water supplies have not been developed, and floods cause costly property damage that suggests a need for more adequate flood-control projects or better flood-plain management. Large water supplies are not readily obtained in upland areas distant from large streams and productive aquifers.

Studies of Water Resources

To meet increased demands for water and to minimize flood damage, accurate hydrologic information is needed throughout New York. Therefore, the U.S. Geological Survey has studied the water resources of several large drainage basins in the State. The studies were undertaken in cooperation with the New York State Water Resources Commission and, more recently, with the New York State Department of Environmental Conservation. The fundamental objective of these studies has been to provide a basis for predicting quantity and quality of water available at various times at any point in each basin, with emphasis on areas of greatest need or potential for water-resources development. Such studies aid State and regional planners, town officials, water-utility personnel, consulting hydrologists, sanitary engineers, and others concerned with development and management of water resources. Reports by Weist and Giese (1970), Kantrowitz (1970), Gilbert and Kammerer (1969, 1971), and Shampine (1973) describe basins or regions bordering the Susquehanna River basin to the north and west.



Base from U.S. Geological Survey
State base map, 1:1,000,000, 1958

Figure 1.--Location of the Susquehanna River basin in New York.

The first product of the study of water resources in the Susquehanna River basin in New York was an appraisal of flow duration and low-flow frequency of streams through 1960 (Hunt, 1967). Streamflow statistics in the present report are based on data through 1967 and thus incorporate the effect of the severe drought of the early 1960's. In addition, the present report summarizes data for some 50 new short-term stations selected to permit a more reliable appraisal of low flow from small drainage basins of diverse geologic character. This report also includes storage and flood-frequency compilations for many stations and an analysis of the chemical quality of streamflow. Two reports on the ground-water resources of the basin (Hollyday, 1969; Randall, 1972) and a preliminary report on urban areas (MacNish and others, 1969) have been released and other reports are in preparation.

Comprehensive plans for management of the water resources of the entire Susquehanna River basin in New York, Pennsylvania, and Maryland have been prepared from a coordinated evaluation of the basin by several Federal and State agencies. The plans and the technical basis for them are summarized in a multi-volume report by the Susquehanna River basin coordinating committee (1970).

FACTORS CONTROLLING STREAMFLOW

Precipitation

Basic Data Available

During this investigation (1964-68), precipitation and other meteorologic data were gathered at 94 stations in New York in or near the Susquehanna River basin. A list of the stations, including their period of record and forms of data available, is included as table 1. Station type and distribution are shown in figure 2. Measurements at the 94 stations include amount of precipitation at 73 stations, temperature at 21, chemical quality at 21, evaporation at 1, and snow cover at 33. Stations discontinued before 1960 are not listed in figure 2 or table 1; not listed either are 23 stations where only snow cover is measured. All snow-cover records are published annually by the National Weather Service in a publication titled "Snow Cover Surveys".

Mean Annual Precipitation

Areal variations in precipitation are a major cause of variations in runoff and in water available from place to place within the Susquehanna River basin. Mean annual precipitation is shown in figure 3. This map was drawn to be as consistent as possible with mean annual precipitation at long-term National Weather Service stations in and near the basin and with long-term mean runoff calculated from gaging-station records (fig. 11). The lines representing precipitation and runoff (figs. 3 and 11) were drawn nearly parallel because the difference between them, which represents water returned to the atmosphere as evapotranspiration, should not vary more abruptly than precipitation or runoff from one area to another.

In a humid region such as New York, evapotranspiration generally remains constant or increases slightly with increased precipitation (Johnston and Cross, 1949, p. 105-6). In the Susquehanna River basin, however, comparison of available precipitation and runoff data suggests that annual evapotranspiration is about 1½ inches (38 millimeters) greater west of Owego than in the eastern part of the basin, even though precipitation averages 6 inches (150 millimeters) less to the west. West of Owego in Tioga, Chemung, and eastern Steuben Counties, altitudes are lower, temperatures slightly higher (Mordoff, 1949), and cloud cover generally less than in the eastern part of the basin; and the percentage of annual precipitation during the growing season is slightly greater west of Owego than in the eastern part of the basin (Dethier, 1966). Perhaps these factors result in more evapotranspiration despite less annual precipitation. More likely, available data do not exactly represent precipitation or runoff. Runoff values are integrated means for the basins gaged, and known sources of error, such as manmade diversions and natural spring seepage northward across the topographic divide, have been approximated; hence, the runoff data are probably more nearly representative of a particular area than are precipitation records at various individual points. Figures 3 and 11 were drawn to indicate an annual evapotranspiration of about 20½ inches (520 millimeters) in the western part of the basin and about 19¼ inches (490 millimeters) to the east, but true evapotranspiration may not vary significantly from 20 inches (510 millimeters).

Table 1.--Meteorologic data-collection stations in and near the Susquehanna River basin, New York

EXPLANATION

Index number: Used to identify site on figure 2.

Station operator: NWS, National Weather Service (formerly U.S. Weather Bureau)
USGS, U.S. Geological Survey

Station name: Name of nearest community

Latitude, longitude, altitude: Small changes in the locations of many NWS stations have been made over the years; the numbers listed are judged most representative. Longitude and latitude are correct to the nearest minute.

Period of record: 5/48-c, continuous since May 1948
1890-c, continuous since 1890

Precipitation data available:

Published data: C, Climatological data, New York, published by National Weather Service
H, Hourly precipitation data, New York, published by National Weather Service
M, Chemical analyses of natural monthly composite samples in Appendix C of this report.

Original record: W, Weekly charts from weighing rainfall gage, in office files or records storage, U.S. Geological Survey, Albany, N.Y.

Machine cards: Available from National Weather Service

Index no.	Station operator	NWS no.	Station name	Latitude ° '	Longitude ° '	Altitude (feet)	Period of record	Published data	Precipitation data available as: Original record	Machine cards: Monthly	Machine cards: Daily	Machine cards: Hourly
1	NWS	0023	Addison	42 06	77 14	990	1890-c	C	-	X	X	-
2	NWS	0085	Alfred	42 15	77 47	1,760	1892-c	C	-	X	X	-
3	NWS	0185	Angelica	42 18	78 02	1,420	1884-c	-	-	X	X	-
4	USGS	-	Bishopville	42 22	77 48	1,550	10/65-10/66	M	-	-	-	-
5	NWS	0360	Bainbridge	42 18	75 29	1,015	1907-c	C	-	X	X	-
6	NWS	0448	Bath	42 20	77 20	1,105	9/53-c	C	-	X	X	-
7	USGS	-	Binghamton	42 04	75 55	1,240	10/65-10/66	M	-	-	-	-
8	NWS	0691	Binghamton	42 06	75 55	858	1889-c	C	-	X	X	X
9	NWS	0687	Binghamton APWB	42 14	75 59	1,601	5/48-c	CH	-	X	X	X
10	NWS	0816	Bradford	42 22	77 06	1,100	2/32-c	C	-	X	X	-
11	NWS	1032	Burdette 1NE	42 25	76 50	1,030	1932-c	C	-	X	X	-
12	NWS	1168	Candor	42 14	76 20	900	5/48-c	C	-	X	X	-
13	NWS	1173	Canisteo	42 16	77 37	1,130	6/49-c	C	-	X	X	-
14	USGS	-	Caroline	42 22	76 17	1,275	9/65-10/66	M	-	-	-	-
15	USGS	-	Trumbull Corners	42 22	76 38	1,550	9/65-10/66	M	-	-	-	-
16	USGS	-	Cedarville	42 56	76 07	1,265	9/65-10/66	M	-	-	-	-
17	NWS	1413	Chemung	42 00	76 38	830	11/38-c	C	-	X	X	-
18	NWS	1436	Cherry Valley 2NNE	42 50	74 45	1,360	8/49-c	C	-	X	X	-
19	NWS	1466	China 1	42 10	75 24	1,460	5/48-c	H	-	X	X	X
	NWS	1471	China 2	42 07	75 24	1,120	12/57-c	C	-	-	-	-
20	NWS	1492	Cincinnatus	42 32	75 54	1,046	8/37-c	C	-	-	-	-
21	NWS	1593	Cobleskill	42 40	74 30	960	1/46-c	C	-	X	X	-
22	NWS	1603	Cohocton SCS	42 28	77 30	1,460	4/40-c	C	-	X	X	-
23	NWS	1752	Cooperstown	42 42	74 55	1,240	1853-c	C	-	X	X	-
24	NWS	1787	Corning	42 08	77 03	930	1929-c	C	-	X	X	-
25	NWS	1799	Cortland	42 36	76 11	1,129	1877-c	C	-	X	X	-
26	USGS	-	Cuyler	42 43	75 58	1,230	8/66-9/68	-	W	-	-	-
27	NWS	1974	Dansville	42 34	77 42	703	1918-c	C	-	X	X	-
28	NWS	1987	Davenport	42 28	74 51	1,300	5/48-c	H	-	X	X	X
29	USGS	-	Decatur	42 38	74 44	1,620	9/65-10/66	M	-	-	-	-
30	NWS	2036	Delhi	42 16	74 55	1,460	1923-c	C	-	X	X	-
31	NWS	2079	DeRuyter 4N	42 49	75 53	2,079	1/32-c	C	-	X	X	-
32	NWS	2351	East Homer 1	42 42	76 07	1,480	1/39-c	H	-	X	X	X
	NWS	2356	East Homer 2	42 43	76 07	1,560	5/48-c	C	-	-	-	-
33	NWS	2454	East Sidney	42 20	75 14	1,155	3/50-c	H	-	X	X	X
34	NWS	2526	Edmeston	42 41	75 15	1,200	5/48-c	H	-	X	X	X
35	NWS	2610	Elmira	42 05	76 48	863	1878-c	C	-	X	X	-

Table 1.--Meteorologic data-collection stations in and near the Susquehanna River basin, New York (Continued)

Index no.	Station operator	NWS no.	Station name	Lati-tude ° '	Long-itude ° '	Altitude (feet)	Period of record	Pub-lished data	Precipitation data available as: Original record	Machine cards Monthly	Daily	Hourly
36	NWS	2615	Elmira CAA AP	42 10	76 54	944	7/38-6/60	C	-	X	X	X
37	USGS	-	Erwins	42 06	77 06	1,470	8/66-9/68	-	W	-	-	-
38	USGS	-	Franklin	42 20	75 06	1,800	8/66-9/68	-	W	-	-	-
39	NWS	3050	Freeville 2NE	42 32	76 19	1,100	6/48-c	C	-	X	X	-
40	USGS	-	Garrattsville	42 38	75 09	1,670	9/65-10/66	M	-	-	-	-
41	NWS	3444	Greene	42 20	75 46	910	8/36-c	C	-	X	X	-
42	USGS	-	Gulf Summit	42 05	75 31	1,360	9/65-10/66	M	-	-	-	-
43	NWS	3575	Hale Eddy	42 04	75 26	1,000	5/53-12/61	C	-	X	X	-
44	NWS	3602	Hamilton	42 49	75 32	1,120	3/37-10/63	C	-	X	X	-
45	NWS	3617	Hammondsport	42 24	77 13	720	1/42-10/54	C	-	X	X	-
46	NWS	3722	Haskinville	42 25	77 34	1,620	1894-c	C	-	X	X	-
47	NWS	3983	Hornell-Almond Dam	42 21	77 42	1,325	2/50-c	CH	-	X	X	X
48	USGS	-	Howard	42 21	77 29	1,410	10/65-10/66	M	-	-	-	-
49	NWS	4070	Hunts Corners	42 26	76 07	1,400	1929-c	H	-	X	X	X
50	NWS	4174	Ithaca-Cornell U.	42 27	76 28	950	5/32-c	CH	-	X	X	X
51	USGS	-	Jasper	42 07	77 28	1,620	7/66-9/68	-	W	-	-	-
52	USGS	-	Kirkwood	42 32	77 25	1,750	8/66-9/68	-	W	-	-	-
53	NWS	4472	Kortright	42 24	74 48	1,900	4/41-10/60	C	-	X	X	-
54	USGS	-	Leonta	42 21	75 07	1,270	9/65-10/66	M	-	-	-	-
55	NWS	4754	Lincklaen	42 41	75 53	1,200		C	-	-	-	-
56	NWS	4772	Lindley	42 02	77 08	985	8/53-c	C	-	X	X	-
57	NWS	4782	Lisle	42 21	76 00	985	7/53-c	C	-	X	X	-
58	NWS	4836	Locke 4W	42 40	76 28	1,310	1/32-c	C	-	X	X	-
59	USGS	-	Lounsberry	42 04	76 19	790	9/65-10/66	M	-	-	-	-
60	USGS	-	Lowman	42 03	76 39	1,510	9/65-10/66	M	-	-	-	-
61	NWS	5512	Morrisville	42 54	75 39	1,325	1910-c	C	-	X	X	-
62	NWS	5687	New Berlin	42 37	75 20	1,080	8/37-c	C	-	X	X	-
63	USGS	-	North Norwich	42 37	75 30	1,030	9/65-10/66	M	-	-	-	-
64	NWS	6085	Norwich	42 32	75 32	1,030	1906-c	C	-	X	X	-
65	NWS	6229	Oneonta 3SE	42 27	75 00	1,130	1/40-c	C	-	X	X	X
66	USGS	-	Otego	42 25	75 12	1,480	7/66-9/68	-	W	-	-	-
67	USGS	-	Owego	42 03	76 14	1,170	7/66-9/68	-	W	-	-	-
68	NWS	6510	Penn Yan	42 39	77 04	730	5/17-c	C	-	X	X	-
69	NWS	6831	Prattsburg 2NW	42 32	77 18	1,910	7/48-c	C	-	X	X	-
70	USGS	-	Red Brook	42 26	75 49	1,400	7/66-9/68	-	W	-	-	-
71	NWS	7195	Rockdale	42 23	75 24	1,025	8/43-c	C	-	X	X	-
72	NWS	7557	Scio	42 10	77 50	1,440	1929-c	C	-	X	X	-
73	NWS	7705	Sherburne 1NW	42 42	75 31	1,050	1907-c	C	-	X	X	-
74	NWS	7830	Smithville Flats	42 24	75 48	1,040	5/48-c	H	-	X	X	X
75	USGS	-	Solsville	42 55	75 30	1,240	9/65-10/66	M	-	-	-	-
76	USGS	-	South Kortright	42 20	74 45	1,510	9/65-10/66	M	-	-	-	-
77	NWS	8088	Spencer	42 13	76 30	995	8/43-c	CH	-	X	X	X
78	NWS	8498	Thurston	42 12	77 20	1,620	5/48-c	H	-	X	X	X
79	USGS	-	Triangle	42 20	75 53	1,110	9/65-10/66	M	-	-	-	-
80	NWS	8611	Truxton	42 43	76 02	1,155	9/53-c	C	-	X	X	-
81	USGS	-	Tyrone	42 23	77 03	1,210	10/65-10/66	M	-	-	-	-
82	NWS	8665	Unadilla	42 19	75 19	1,020	8/43-c	C	-	X	X	-
83	USGS	-	Union Valley	42 37	75 53	1,170	9/65-10/66	M	-	-	-	-
84	NWS	9125	West Cameron	42 13	77 25	1,080	8/53-c	C	-	X	X	-
85	USGS	-	West Caton	42 04	77 04	1,460	9/65-10/66	M	-	-	-	-
86	NWS	9229	West Jasper	42 09	77 34	2,220	5/48-c	H	-	X	X	X
87	NWS	9437	Whitney Point	42 19	75 58	1,040	4/33-c	C	-	X	X	-
88	NWS	9442	Whitney Point Dam	42 21	75 58	970	5/48-c	H	-	X	X	X
89	USGS	-	Woodhull	42 04	77 28	1,590	10/65-10/66	M	-	-	-	-
90	USGS	-	Yaleville	42 21	75 29	1,290	9/65-10/66	M	-	-	-	-
91	NWS	8160	Stamford	42 24	74 37	1,827	4/41-c	C	-	X	X	-
92	NWS	8594	Troupsburg 4NE	42 04	77 30	1,850	1/40-c	C	-	X	X	-

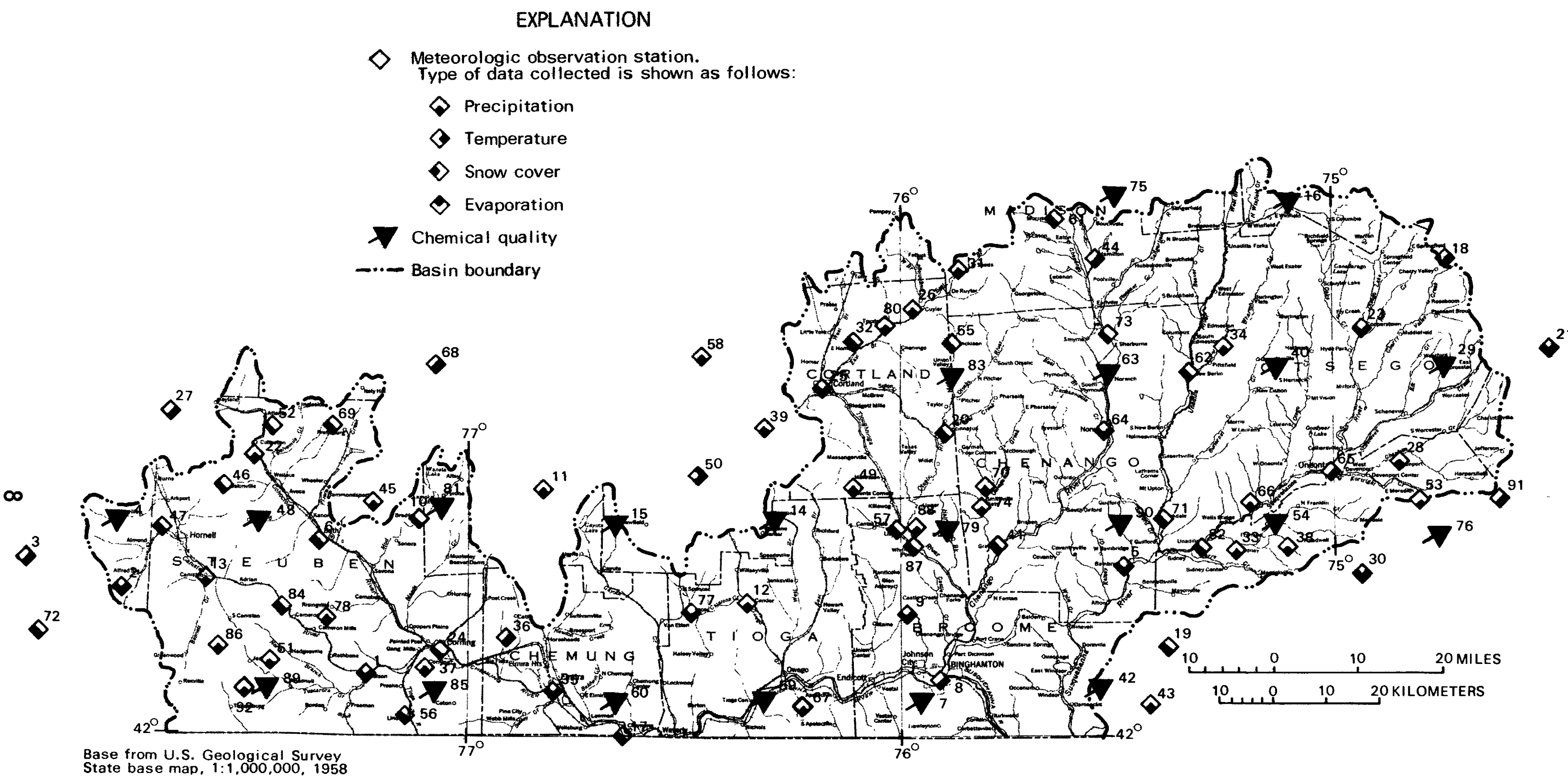


Figure 2.--Locations of meteorologic data-collection stations. *Numbers refer to index numbers in table 1.*

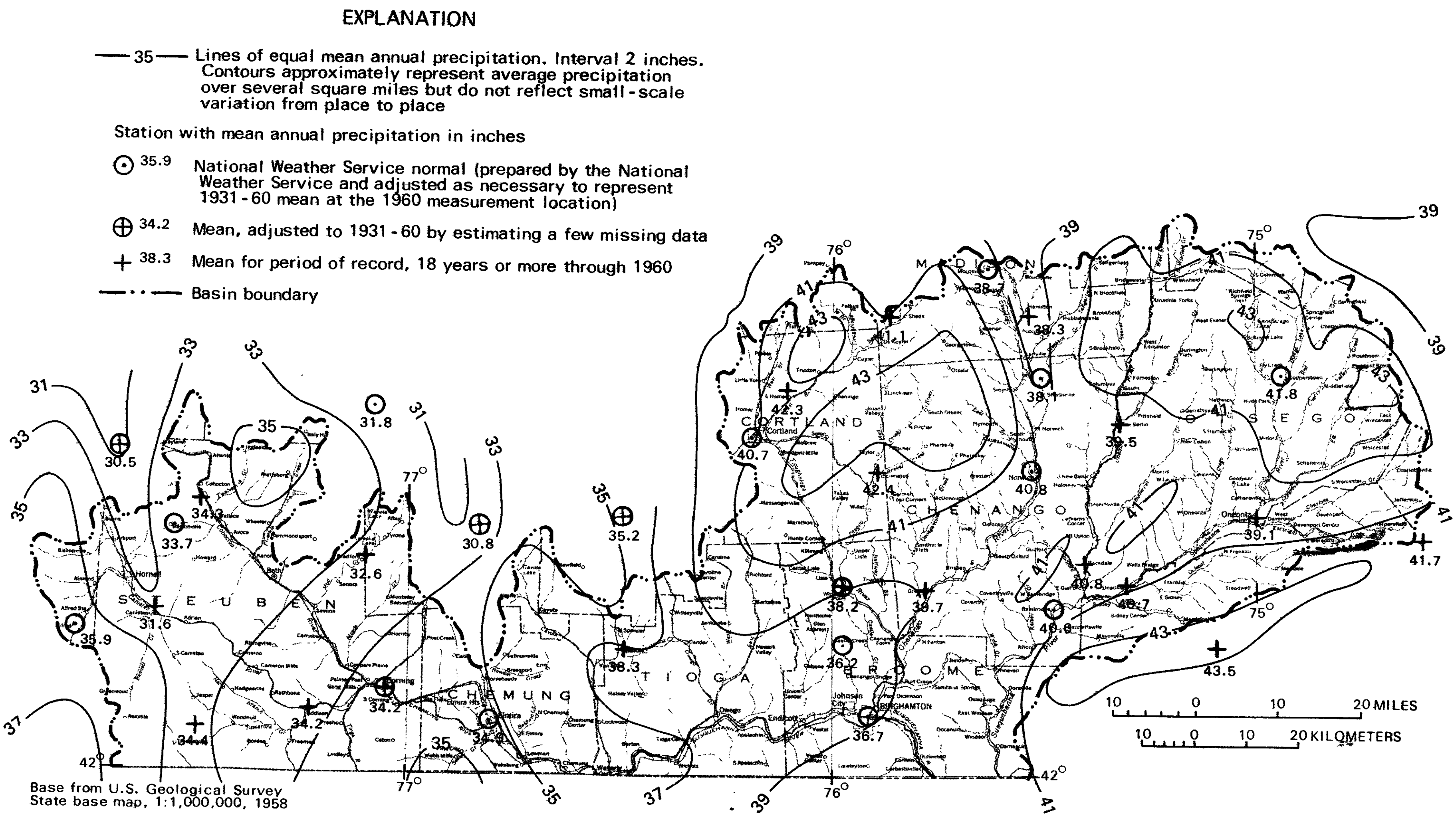


Figure 3.--Mean annual precipitation in the Susquehanna River basin, 1931-60.

Regression analysis of long-term mean precipitation in and near the Susquehanna and the Delaware River basins in New York and nearby parts of Pennsylvania, undertaken as part of this study, showed a strong correlation of precipitation increasing with altitude. However, the correlation may have been controlled by large differences in altitude between the Appalachian Plateau (including the Susquehanna River basin), the much higher Catskill Mountains to the east, and the much lower Ontario-Mohawk Lowland to the north. Whether differences in altitude between narrow valleys of the Susquehanna River basin and the general surrounding upland have a great influence on precipitation could not be clearly determined. If differences in altitude within the Susquehanna River basin are significant, basin precipitation shown in figure 3 may be too low because nearly all precipitation stations are near population centers on the valley bottoms. The influence of altitude and other parameters on precipitation was found to vary from one region to another within the nearby Delaware River basin (Hely and Nordenson, 1961). Small upland catchments within the Susquehanna River basin tend to have greater average runoff than nearby larger catchments of lower average altitude, but a plot of runoff versus altitude would show wide scatter. The subject deserves further study but will be difficult to resolve unless precipitation is measured at more upland stations, preferably close to valley-bottom stations for comparison.

Variation in Precipitation With Time

Average seasonal and monthly precipitation through 1964 is described and tabulated by Dethier (1966). He shows that precipitation on the Susquehanna River basin is in general uniformly distributed during the year, although it is somewhat greater in spring and summer than in fall and winter. In the Chemung River basin, about 50 percent of the annual precipitation occurs during the growing season (May-September); in the eastern Susquehanna River basin, 45-50 percent occurs during the growing season.

For New York as a whole, annual precipitation has been as low as 80 percent of normal, and rainfall during the growing season has been as low as 67 percent of normal, both in 1964 (Dethier, 1966, p. 36). Percentage departures from normal have been even larger for shorter periods in particular localities. Variability of annual precipitation over a 36-year period at two stations in the Susquehanna River basin is shown in figure 4. Departures from normal precipitation during the drought years 1962-67 at these same two stations are shown in figure 5A. By the end of the 6-year drought, the cumulative deficiency in precipitation was equal (at Binghamton) or nearly equal (at Norwich) to the amount of precipitation normally received in 1 year. For comparison, departures from normal runoff during the same period at two nearby gaging stations are shown in figure 5B. Percentagewise, runoff falls farther below normal than precipitation during drought, whereas percentage reduction in evapotranspiration is slight.

Geology and Physiography

The Susquehanna River basin in New York is geologically rather homogenous. The bedrock is a monotonous sequence of flat-lying shale and siltstone across most of the basin. Sandstone is found in the east-central

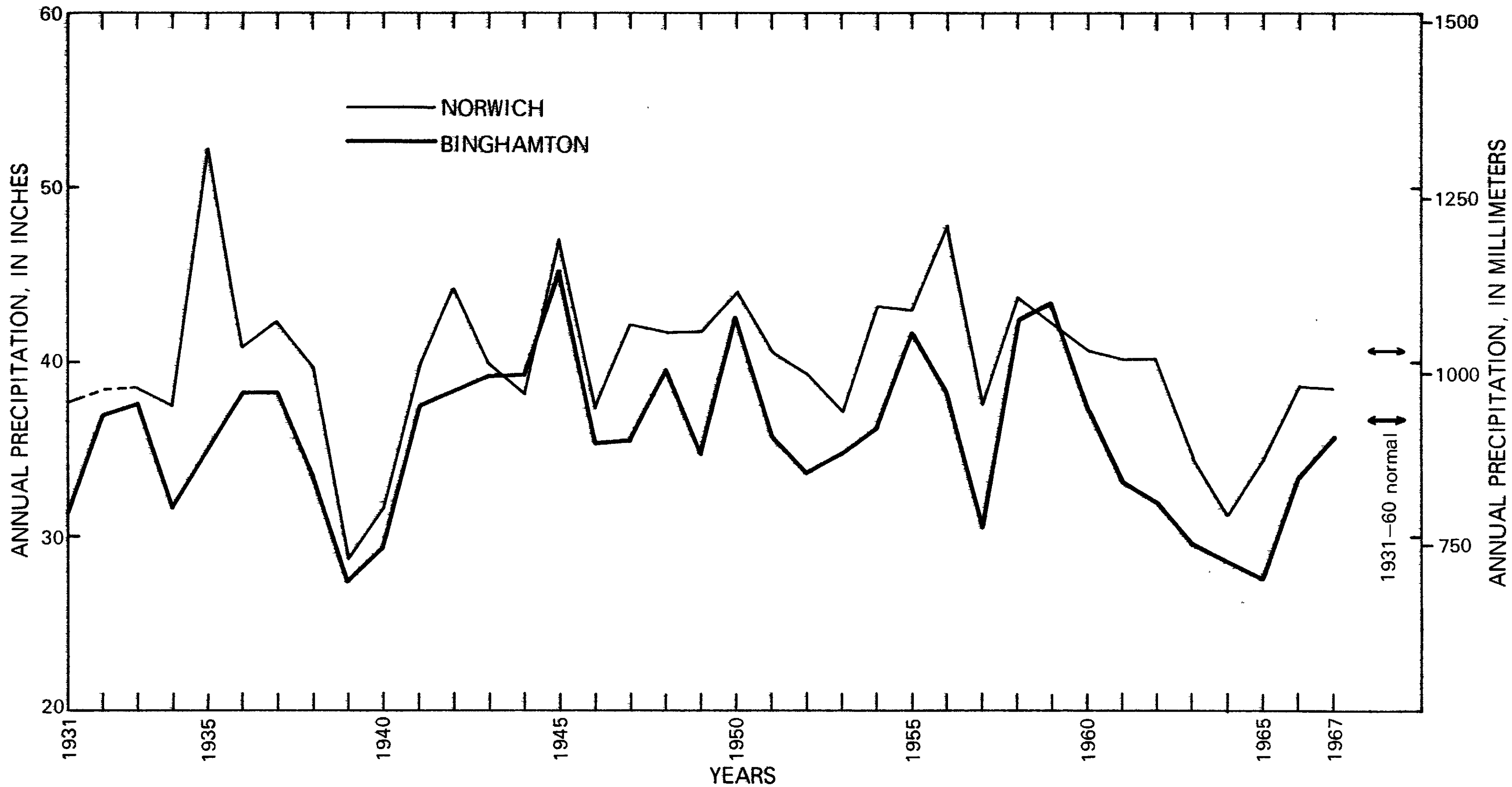


Figure 4.--Variation in annual precipitation at Binghamton and Norwich, 1931-67.

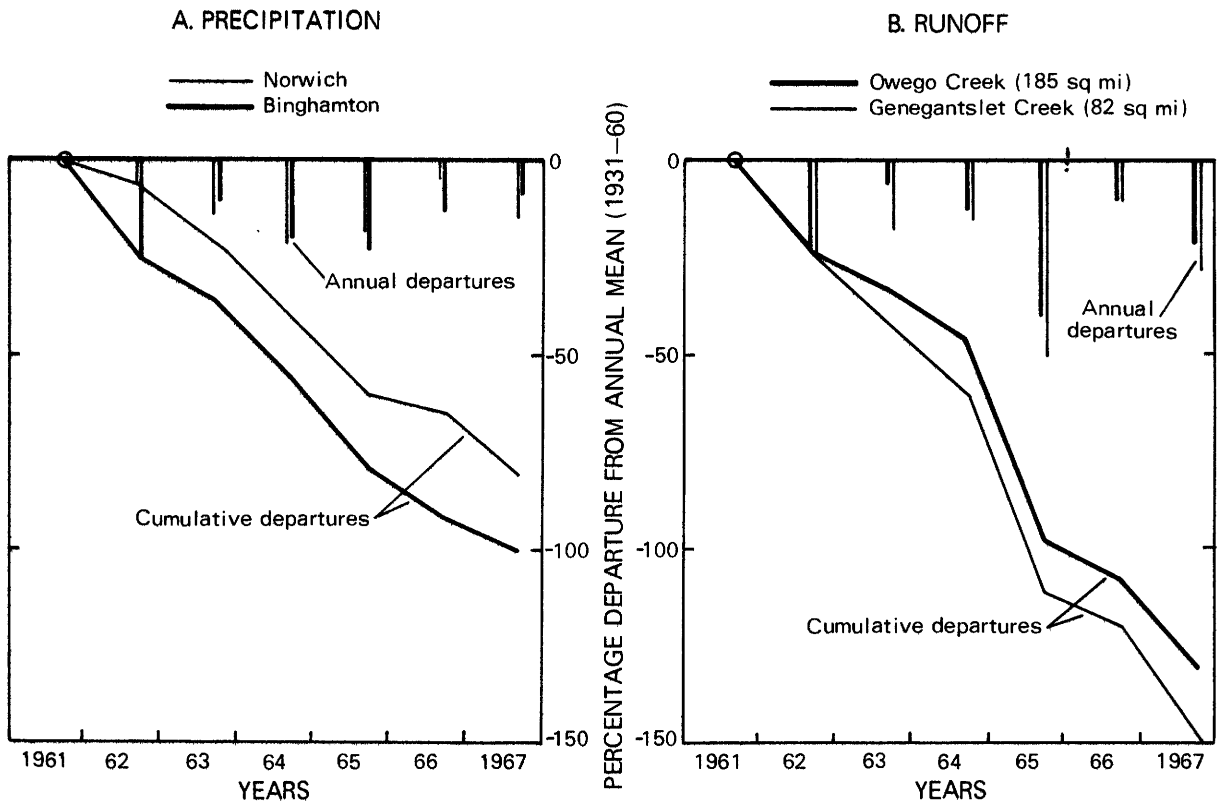


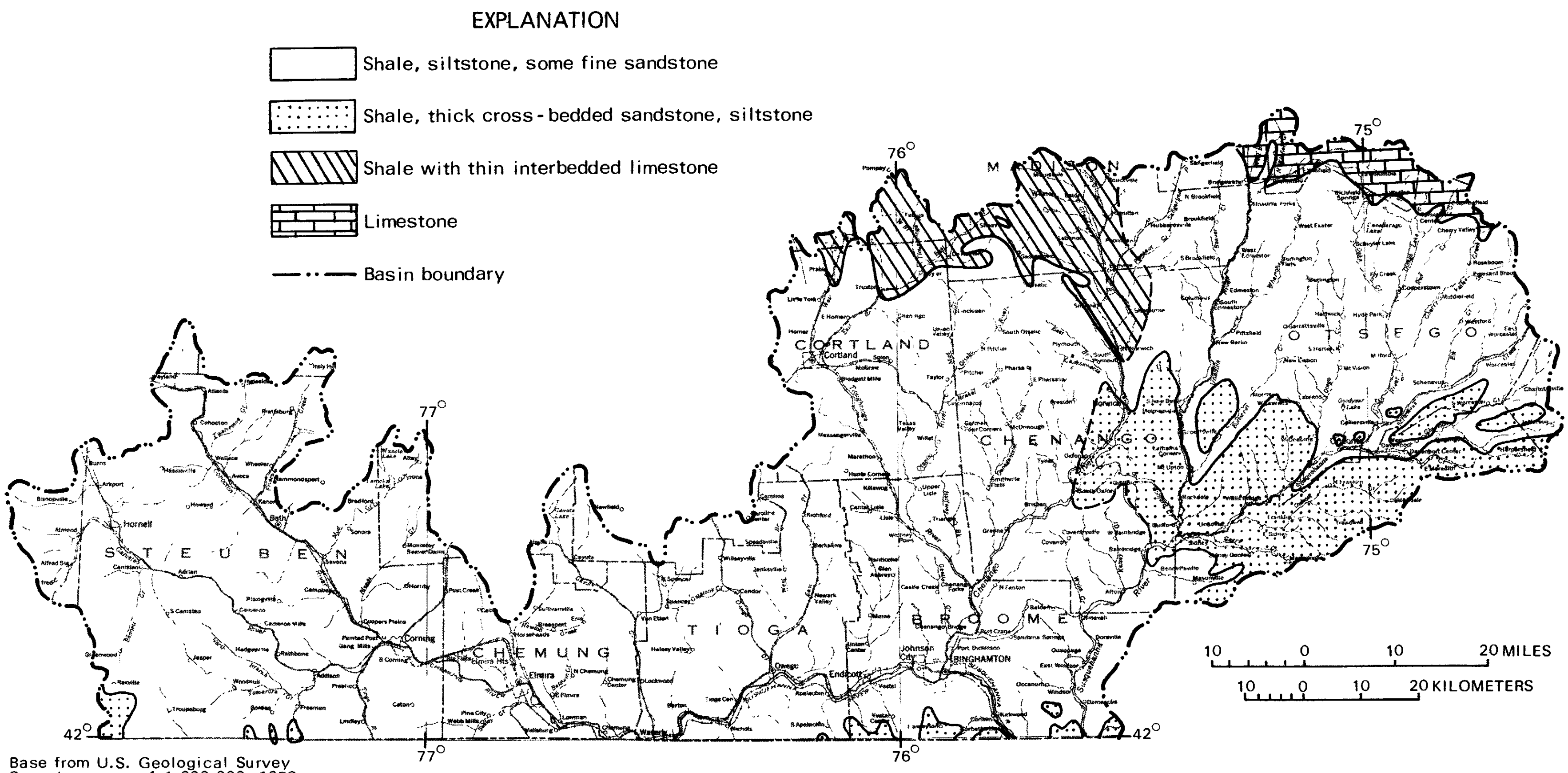
Figure 5.--Departures from normal precipitation and runoff during drought years 1962-67.

A. *Precipitation at Norwich and at Binghamton. Mean annual (normal) precipitation for 1931-60 was 40.8 inches (1,040 millimeters) at Norwich, 36.7 inches (932 millimeters) at Binghamton.*

B. *Runoff from Owego Creek, 18 miles west of Binghamton, and Genegantslet Creek, 12 miles west of Norwich. Mean annual (normal) runoff for 1931-60 was 19.6 inches (498 millimeters) from Owego Creek, 22.8 inches (579 millimeters; estimated) from Genegantslet Creek.*

part of the basin and near high hilltops along the Pennsylvania border (fig. 6) but does not seem to have a major effect on streamflow. Limestone beds along parts of the north and the northeast margins of the basin (fig. 6) are responsible for greater hardness of water in these areas than elsewhere in the basin. The small, exclusively limestone area in the northeast has low relief and underground drainage through sinkholes, which may affect the amount or timing of runoff reaching local streams.

The outstanding geologic contrast within the Susquehanna River basin is largely due to glaciation. About 85 percent of the basin is a dissected upland of steep-sided hills and narrow stream valleys. Bedrock throughout the upland is mantled by glacial till, which is typically a stony clayey silt of very low permeability. Interrupting the upland are the major valleys, which were enlarged to a width of half a mile to 2 miles (0.8 to 3.2 kilometers) and were deepened by glacial ice. These valleys now contain a



Base from U.S. Geological Survey
State base map, 1:1,000,000, 1958

Figure 6.--Types of bedrock in the Susquehanna River basin
(adapted from Broughton and others, 1962).

variety of stratified sediment laid down in temporary lakes and along the channels of melt-water streams as the great glacier melted. The upper part of the stratified drift is permeable sand and gravel in most places, although 5 to 20 feet (1.5 to 6.1 meters) of silt having moderately low permeability caps the coarser sediment in the flood plains of major rivers. In parts of some valleys, surficial sand or gravel is underlain by fine-grained sediment at very shallow depth. The only sand and gravel in most upland areas occurs as narrow bands of post-glacial alluvium close to the streams. Large masses of sand and gravel were deposited in a few upland valleys, in places where lakes happened to be trapped between high hills and tongues of ice in the major valleys. The only section of the basin where upland sand and gravel deposits are numerous is between the Cohocton River and the Canisteo River northwest of Bath and Canisteo. The percentage of basin area covered by sand and gravel (stratified drift and alluvium) has a dominant effect on streamflow (Thomas, 1966). Streamflow from basins covered almost entirely by till fluctuates more widely and rapidly than flow from basins having a substantial area covered by stratified drift and alluvium. Steep slopes and impermeable soils in the areas of till favor rapid runoff. Only a small amount of water infiltrates, and it is subject to loss by transpiration during the growing season as it moves downslope through the top foot or so of the soil. By contrast, most rainfall infiltrates the soil in areas of stratified drift and alluvium, and the part of this water that reaches the water table is locally below the reach of plants as it moves slowly toward streams to sustain their flow in dry weather.

In addition to influencing the timing of runoff, geology causes local variations in the proportion of runoff that is carried by the stream channel. Where width, thickness, or permeability of the sand and gravel in a valley increases markedly, there is usually a marked increase in ground-water underflow and a corresponding decrease in streamflow. This can be significant in smaller streams during periods of low flow. Predicting the location of major changes in thickness or permeability may be difficult without detailed knowledge of subsurface geology or closely spaced measurements of streamflow. However, one pattern is universal throughout the Susquehanna River basin: wherever a tributary stream leaves its own valley to cross the sand and gravel fill of a larger valley, the tributary loses water (fig. 7). This is true on all scales. For example, a tiny creek flowing on till or bedrock and draining perhaps a square mile (2.6 square kilometers) loses water where it crosses a layer of alluvial gravel that is 500 feet (150 meters) wide and borders an upland stream draining 10 or 20 square miles (25 or 50 square kilometers). The upland stream, in turn, loses water where it enters the valley of a major river and crosses a thick deposit of stratified drift or its own alluvial fan (fig. 7). Tributary streams commonly dry up in late summer in these zones of underflow. Measurements at several partial-record stations in this type of underflow zone are summarized in Appendix A. However, each of these stations is labeled to show that the distribution of low flow is valid only at the measurement site and cannot be extrapolated as an indication of basin runoff or streamflow at points upstream.

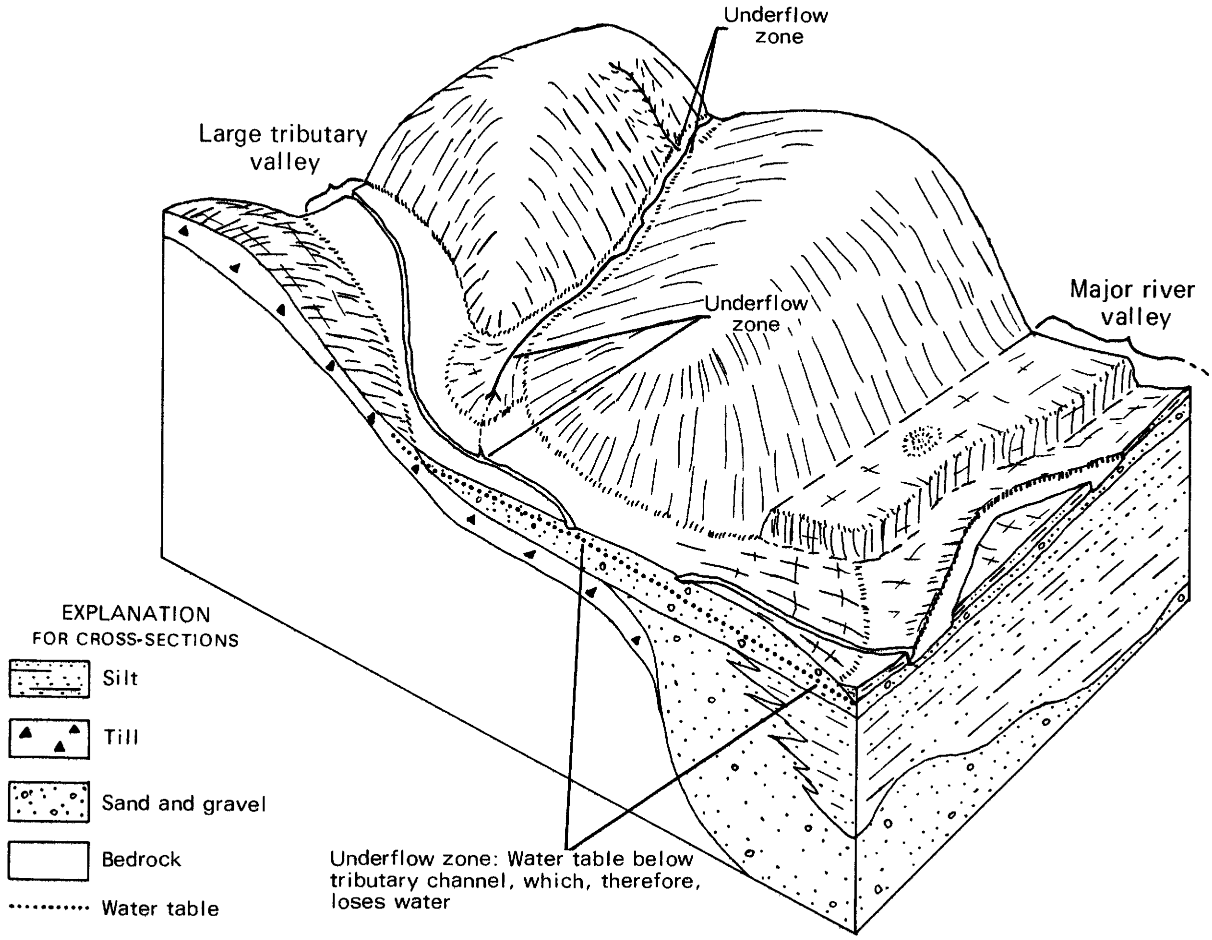


Figure 7.--Typical distribution of underflow zones.

The magnitude of water loss and the difficulty of precisely correlating flows in an underflow zone are illustrated in figure 8. Thorn Hollow Creek flows on bedrock at a partial-record station near Owego (Station 01-5148.20, Appendix A) and on till at several points as far as 1,000 feet (300 meters) downstream. Streamflow measurements anywhere in this reach are nearly identical. Downstream from the last till exposure the creek flows on the gravel of its alluvial fan, which rests on stratified drift in the Susquehanna River valley. Measurements 850 feet (260 meters) downstream from the last till exposure (fig. 8) reveal losses of as much as 0.3 cubic feet per second (8.5 liters per second) and plot as a reasonably well-defined curve. Measurements farther downstream show greater but less consistent departures from flow near the partial-record station. The inconsistency is presumably caused by variations in infiltration rate. These variations may be caused by changes in depth to the water table, transpiration by streambank vegetation, water temperature, and, occasionally, by air trapped in the gravel. Differences in rate of water loss from one date to another cause scatter when flows at measurement stations are correlated. Figure 8 also shows that changes of as little as 50 feet (15 meters) in the site of measurement would cause scatter in correlation for a station in this underflow zone. Furthermore, correlation curves for stations in underflow zones tend to have steep slopes even when flow is correlated with a nearby site on the same stream; therefore, correlation is likely to be insensitive.

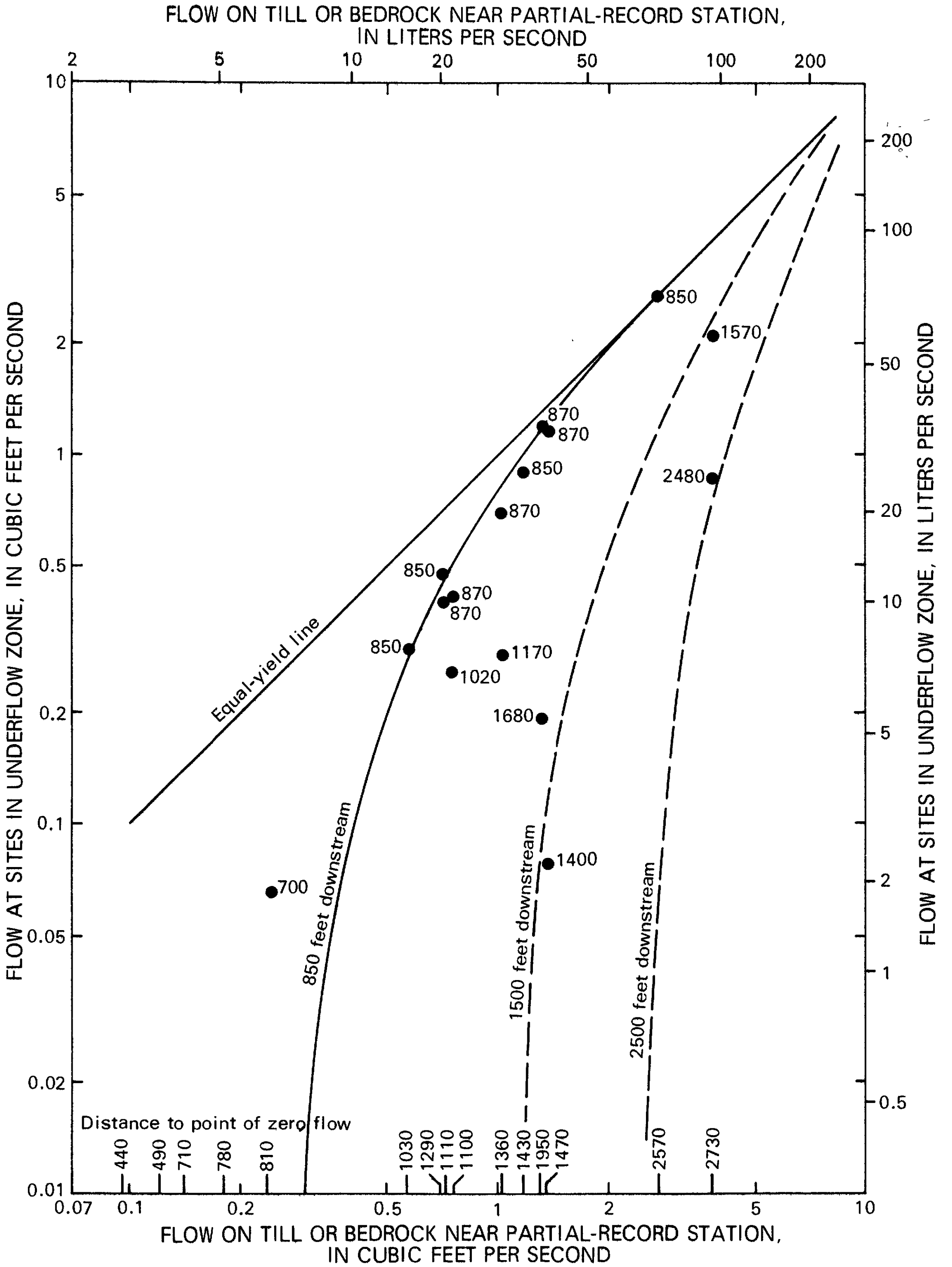


Figure 8.--Flow of Thorn Hollow Creek across till or bedrock, correlated with flow downstream in underflow zone. *Dashed lines are less well defined than solid lines. Numbers near each data point (measurement of flow, or observation of point of zero flow) represent distances, in feet, downstream from last till exposure in channel. All data were collected within 2 hours of measurements of flow across till or bedrock.*

STREAMFLOW DATA

The flow past any given point on a stream varies from day to day, season to season, and year to year. Continuous records of streamflow have been obtained at 60 stations in the Susquehanna River basin over periods as short as a few months to as long as 64 years through 1970. In addition, reservoir levels have been monitored continuously for 19 or more years at four stations. The locations of all stations active in 1968 and eight stations that were discontinued before 1965 but whose records were adequate for analysis in this report are shown in figure 9. The period of continuous record at each station is shown in table 2.

Supplementing the continuous-record stations are 110 partial-record stations, where low flow has been measured occasionally over several years. Locations of these stations are shown in figure 10, and the number of low-flow measurements at each station is listed in table 3.

Streamflow records are compiled by the Geological Survey by water years, ending September 30, rather than by calendar years, and most analyses are based on annual data for water years. In this report, years of record are water years unless otherwise stated.

Variations in streamflow with time at both continuous-record and partial-record stations are summarized in Appendix A. Flow distributions for partial-record stations were estimated by correlation with nearby long-term continuous-record stations. For readers interested in undertaking further analysis, daily flows at continuous-record stations and individual measurements at partial-record stations for the years 1913-65 have been published in Geological Survey Water-Supply Papers listed in the table on page 19. Similar records for the years 1966 through 1970 have been released in a series of annual reports now titled "Water Resources Data for New York, Part 1, Surface-Water Records," distributed by the Geological Survey in Albany. Some measurements at partial-record stations before 1961 and in 1967-69 are listed as "miscellaneous measurements" in these publications. Water-Supply Papers 1302 and 1722 include monthly and annual flows for years through 1950 and 1951-60, respectively. Except for stations discontinued before 1960, daily flows for the entire period of record at any continuous-record station are stored on magnetic tape at the Geological Survey in Reston, Va. The original records for all stations, which show diurnal fluctuations, hours at which measurements were made, and other details, may be inspected at offices of the Geological Survey in Albany or Ithaca, N.Y.

Streamflow records in this report are numbered and are tabulated in downstream order. That is, a station near the headwaters of a particular stream is listed before one farther downstream, and all stations on a tributary are listed before any stations on the main stem downstream from where the tributary enters.

Published Daily Mean Flows 1913-65 [1]

Year	WSP	Year	WSP	Year	WSP	Year	WSP
1913	351	1926	621	1938	851	1950	1171
1914	381	1927	641	1939	871	1951	1202
1915	401	1928	661	1940	891	1952	1232
1916	431	1929	681	1941	921	1953	1272
1917	451	1930	696	1942	951	1954	1332
1918	471	1931	711	1943	971	1955	1382
1919-20	501	1932	726	1944	1001	1956	1432
1921	521	1933	741	1945	1031	1957	1502
1922	541	1934	756	1946	1051	1958	1552
1923	561	1935	781	1947	1081	1959	1622
1924	581	1936	801	1948	1111	1960	1702
1925	601	1937	821	1949	1141	1961-65	1903

[1] Water-Supply Paper 1903 is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 ($4.00 per copy; prepayment is required). All other Water-Supply Papers (WSP's) in this list are out of print and not purchasable from the Superintendent of Documents. However, they are available for reference nationwide at many large public and university libraries.

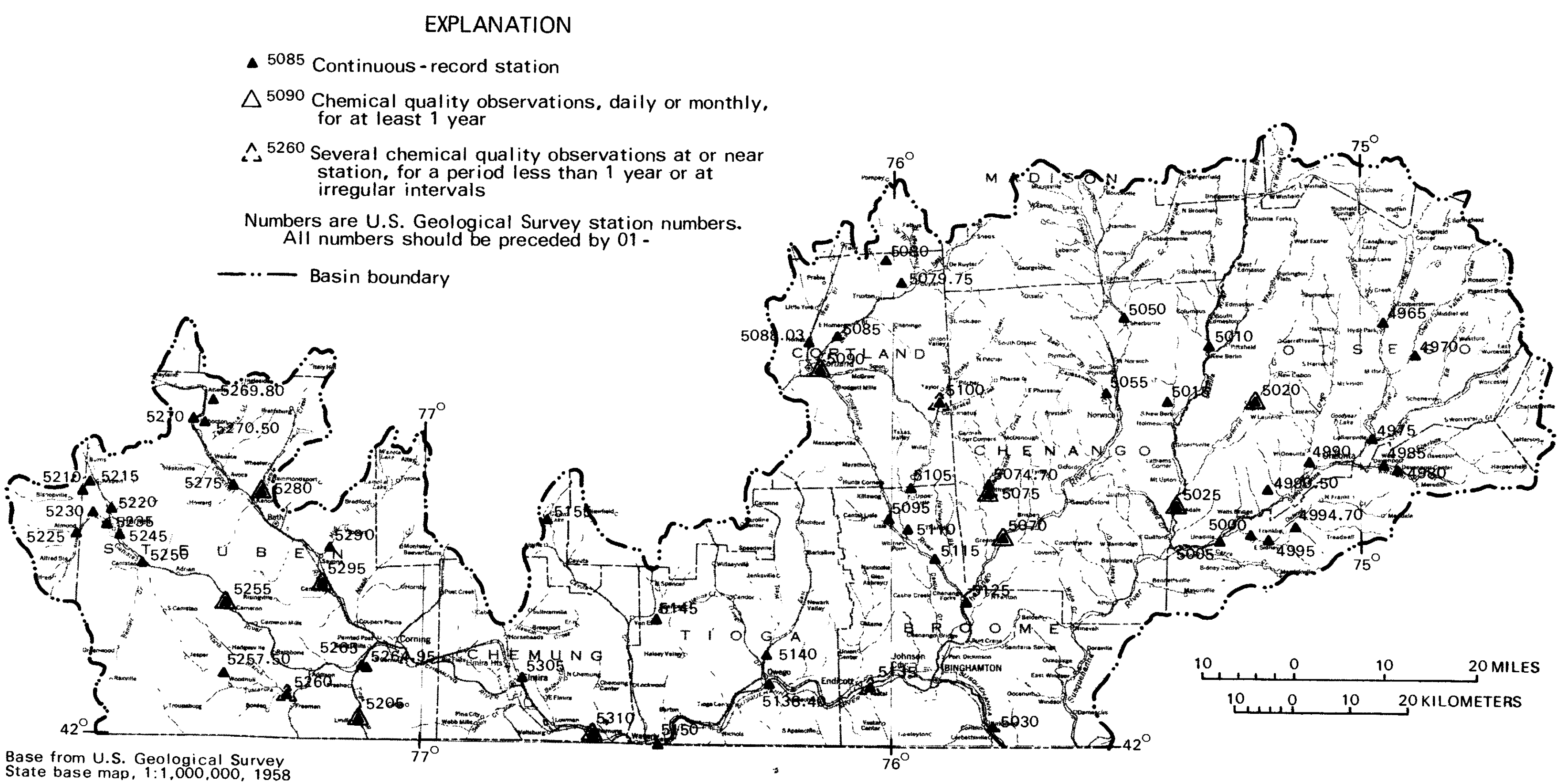


Figure 9.--Locations of continuous-record stream-gaging stations in the Susquehanna River basin.

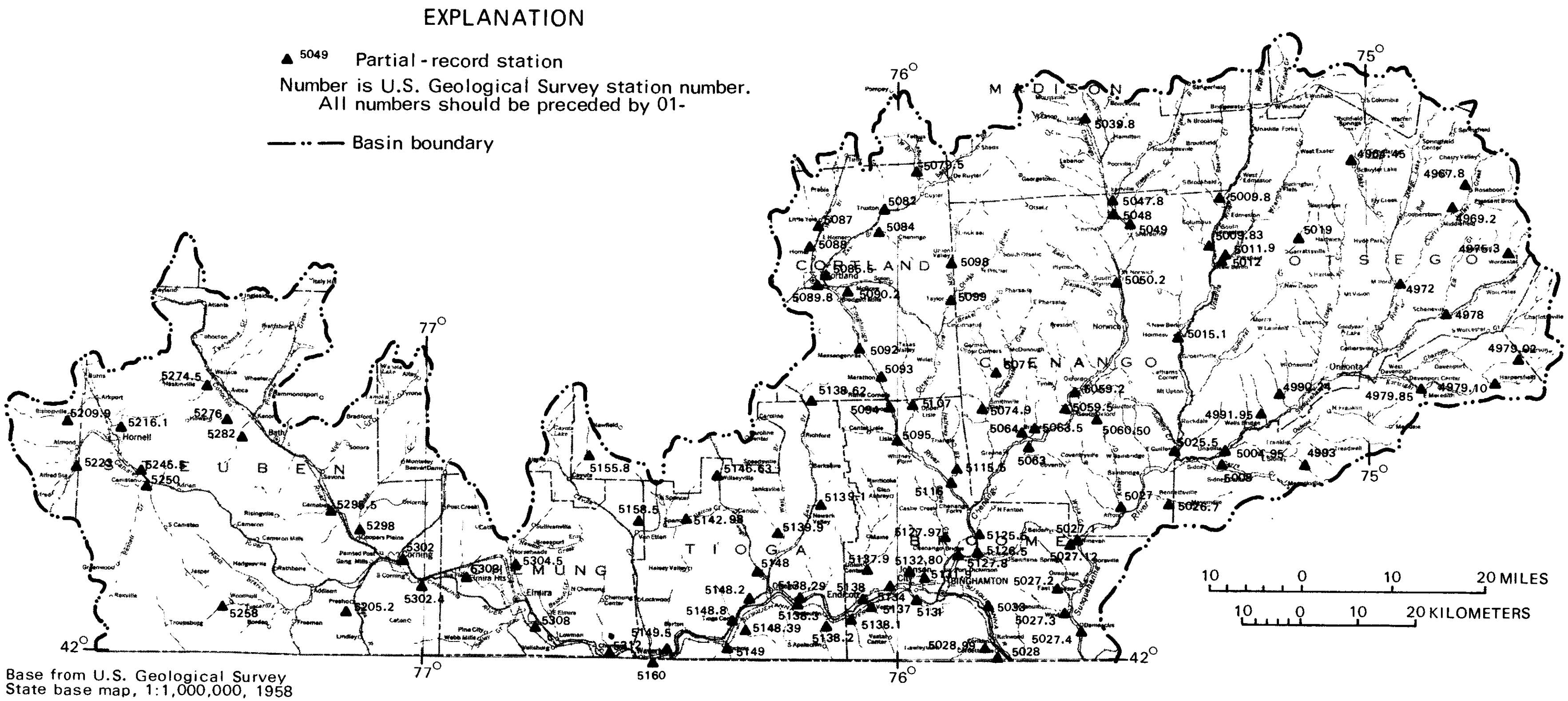


Figure 10.--Locations of low-flow partial-record stations in the Susquehanna River basin.

Table 2.--Period of record through 1970 at continuous-record stations in the Susquehanna River basin, New York

USGS station number	Stream and location	Drainage area (sq mi)
01-4965.00	Oaks Creek at Index	102
01-4970.00	Cherry Valley Creek at Westville	81.3
01-4975.00	Susquehanna River at Colliersville	349
01-4980.00	Charlotte Creek at Davenport Center	163
01-4985.00	Charlotte Creek at West Davenport	167
01-4990.00	Otego Creek near Oneonta	108
01-4990.50	Flax Island Creek near Otego	4.22
01-4994.70	East Branch Handsome Brook near Franklin	9.12
01-4995.00	East Sidney Reservoir at East Sidney	102
01-5000.00	Ouleout Creek at East Sidney	103
01-5005.00	Susquehanna River at Unadilla	984
01-5010.00	Unadilla River near New Berlin	199
01-5015.00	Sage Brook near South New Berlin	.70
01-5020.00	Butternut Creek at Morris	59.6
01-5025.00	Unadilla River at Rockdale	518
01-5030.00	Susquehanna River at Conklin	2,240
01-5050.00	Chenango River at Sherburne	264
01-5055.00	Canasawacta Creek near South Plymouth	58.3
01-5070.00	Chenango River at Greene	598
01-5074.70	Red Brook at Smithville Flats	7.06
01-5075.00	Genegantslet Creek at Smithville Flats	83.1
01-5079.75	Muller Gulf Creek near Cuyler	2.67
01-5080.00	Shackham Brook near Truxton	2.95
01-5085.00	Albright Creek at East Homer	6.81
01-5088.03	West Branch Tioughnoiga River at Homer	71.5
01-5090.00	Tioughnioga River at Cortland	292
01-5095.00	Dudley Creek at Lisle	31.8
01-5100.00	Otselic River at Cincinnatus	147
01-5105.00	Otselic River at Upper Lisle	217
01-5110.00	Whitney Point Reservoir at Whitney Point	255

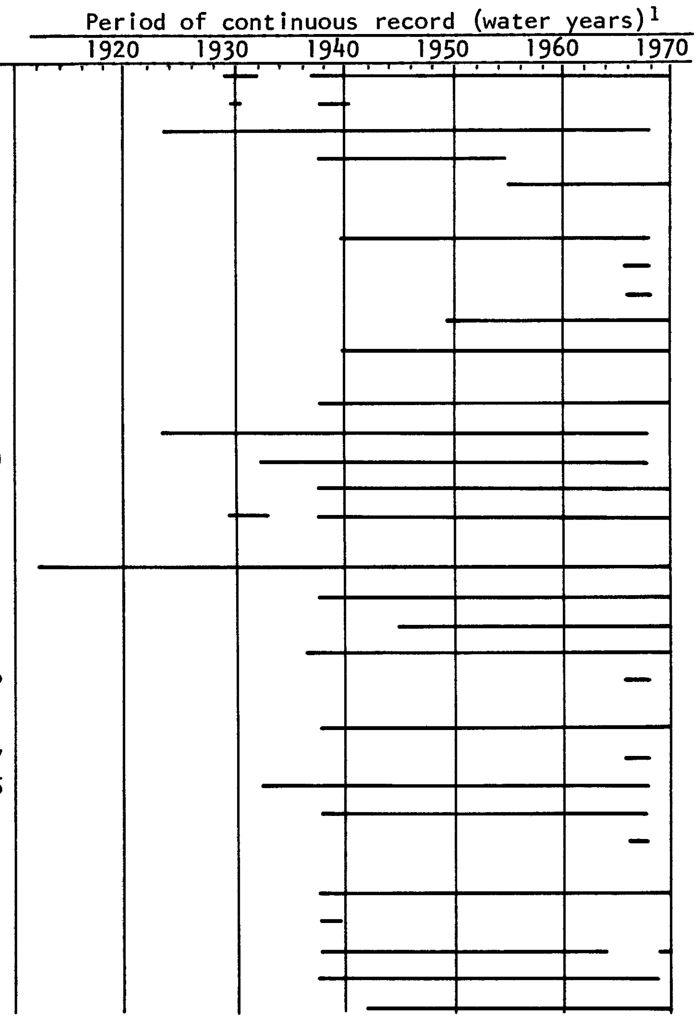
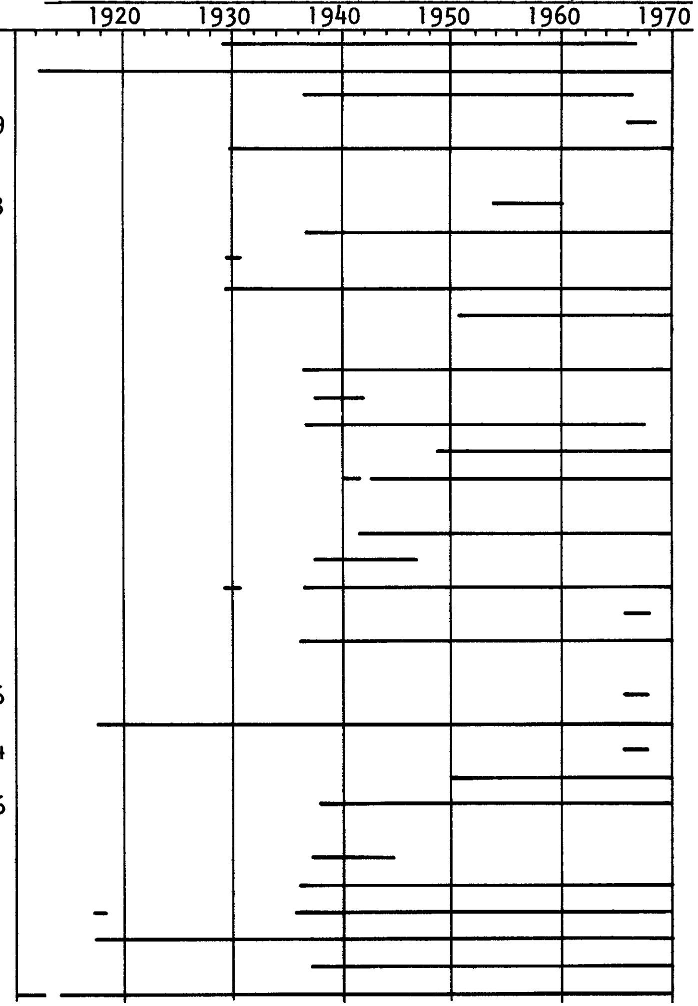


Table 2.--Period of record through 1970 at continuous-record stations in the Susquehanna River basin (Continued)

USGS station number	Stream and location	Drainage area (sq mi)	Period of continuous record (water years)[1]
01-5115.00	Tioughnioga River at Itaska	735	
01-5125.00	Chenango River at Chenango Forks	1,492	
01-5135.00	Susquehanna River at Vestal	3,960	
01-5138.40	Pumpelly Creek at Owego	8.59	
01-5140.00	Owego Creek near Owego	186	
01-5145.00	Dean Creek at Spencer	8.03	
01-5150.00	Susquehanna River near Waverly	4,780	
01-5155.00	Cayuta Creek near Alpine	17.6	
01-5205.00	Tioga River at Lindley	770	
01-5210.00	Arkport Reservoir near Arkport	30.4	
01-5215.00	Canisteo River at Arkport	30.4	
01-5220.00	Canisteo River at Hornell	95	
01-5225.00	Karr Valley Creek at Almond	27.4	
01-5230.00	Almond Reservoir near Almond	56	
01-5235.00	Canacadea Creek near Hornell	58.7	
01-5245.00	Canisteo River below Canacadea Creek	159	
01-5250.00	Bennett Creek at Canisteo	95.8	
01-5255.00	Canisteo River at West Cameron	342	
01-5257.50	Tuscarora Creek Tributary near Woodhull	9.5	
01-5260.00	Tuscarora Creek near South Addison	114	
01-5264.95	Mulholland Creek near Erwins	5.06	
01-5265.00	Tioga River near Erwins	1,370	
01-5269.80	Kirkwood Creek near Atlanta	4.64	
01-5270.00	Cohocton River at Cohocton	53.3	
01-5270.50	Switzer Creek at Cohocton[2]	3.46	
01-5275.00	Cohocton River at Avoca	157	
01-5280.00	Fivemile Creek near Kanona	68	
01-5290.00	Mud Creek near Savona	76.1	
01-5295.00	Cohocton River near Campbell	472	
01-5305.00	Newtown Creek at Elmira	79.8	
01-5310.00	Chemung River at Chemung[3]	2,530	



[1] Vertical lines drawn at end of indicated water years.
[2] Data compiled by U.S. Dept. Agriculture, Agr. Research Service, Danville, Vt. Not analyzed in this report.
[3] Record complete 1906-1970 except for 1914.

Table 3.--Low-flow partial-record stations with summary of measurements through 1969, Susquehanna River basin, New York

Stream and location	USGS station number	Drainage area (square miles)	Number of low-flow measurements	Water years in which measurements were made
Apalachin Creek at Apalachin	01-5138.20	43.7	a/ 7	1962-66
Bear Brook at Walker Corners	01-5060.50	15.0	7	1966-68
Beaver Creek near South Edmeston	01-5009.80	32.7	7	1962-66
Belden Brook at Harpursville	01-5027.12	11.6	6	1962-65
Bennett Creek at Canisteo	01-5250.00	95.8	11	1957-62
Big Brook above Bennettsville	01-5026.70	25.4	9	1966-68
Big Creek near North Hornell	01-5216.10	16.8	14	1966-68
Bowman Creek near Tyner	01-5059.50	26.8	7	1962-66
Brier Creek near Otego	01-4991.95	6.96	8	1966-68
Butternut Creek near Garrattsville	01-5019.00	16.0	7	1966-68
Campbell Creek near Kanona	01-5282.00	32.8	16	1935, 1953, 1957-62, 1965
Canacadea Creek near Almond	01-5223.00	17.1	14	1956-60, 1962, 1965
Canisteo River at Bishopville	01-5209.90	21.6	12	1966-67
Carrs Creek at Unadilla	01-5008.00	29.6	b/ 21	1954-55, 1957-62, 1964-67
Carter Creek near Cayuta	01-5155.80	4.76	13	1966-68
Castle Creek at Glen Castle	01-5127.97	27.7	7	1966-67
Castle Creek at Hinman Corners	01-5128.00	28.9	c/ 14	1956-62, 1964
Castle Creek near Wallace	01-5274.50	9.23	13	1966-68
Catatonk Creek near Owego	01-5148.00	147	14	1956-62, 1964
Cayuta Creek at Waverly	01-5160.00	140	263	1938-69
Center Brook near New Berlin	01-5009.83	10.9	8	1966-68
Center Brook at West Harpersfield	01-4979.10	12.9	5	1967-68
Chenango River at Eaton	01-5039.80	24.3	a/ 4	1964-65
Cheningo Creek near Truxton	01-5084.00	30.0	a/ b/ 7	1962-66
Cherry Valley Creek at Milford	01-4972.00	90.4	14	1956-62, 1964
Cherry Valley Creek tributary at Roseboom	01-4967.80	1.60	7	1966-68
Choconut Creek at Vestal	01-5137.00	57.0	19	1956-65
Cold Brook at Little York	01-5087.00	15.4	8	1962-66
Cold Brook near North Norwich	01-5050.20	6.50	7	1962-66
Cunningham Creek near Canisteo	01-5245.50	5.34	15	1966-68
Doolittle Creek at Weltonville	01-5139.90	17.0	a/ b/ 7	1962-66
Dudley Creek at Lisle	01-5095.00	31.8	7	1962-66
East Branch Owego Creek tributary at Harford Mills	01-5138.62	5.77	8	1966-68
East Branch Tioughnioga River near Cortland	01-5085.50	193	14	1956-61, 1964
Ellis Creek near Barton	01-5149.50	16.0	a/ b/ 8	1962-66
Factory Brook at Homer	01-5088.00	15.8	8	1962-66
Finch Hollow Creek at Oakdale	01-5132.80	3.96	19	1966-69
Five Streams near Smithville Flats	01-5071.00	10.1	b/ 9	1964, 1966-68
Fuller Hollow Creek at Johnson City	01-5131.00	3.52	a/ 7	1962-66
Gillette Creek near South Corning	01-5302.40	3.77	9	1966-68
Goff Creek near Howard	01-5276.00	17.9	12	1967
Great Brook at Holmesville	01-5015.10	25.9	8	1962-66
Gridley Creek at Messengerville	01-5092.00	16.1	a/ 7	1962-66
Guilford Creek at East Guilford	01-5025.50	17.8	d/ 9	1966-67
Halfway Brook near Itaska	01-5116.00	21.8	7	1962-66
Halfway Brook near Triangle	01-5115.50	18.5	6	1966-67
Handsome Brook at Sherburne	01-5049.00	37.9	7	1962-66
Herkimer Creek near Schuyler Lake	01-4964.45	7.68	a/ 8	1966-68
Hunts Creek near Lounsberry	01-5148.39	6.78	7	1966-68
Hunts Creek at Marathon	01-5093.00	10.8	15	1962-68
Jennings Creek at Killawog	01-5094.00	14.4	7	1962-66
Kelsey Creek at Afton	01-5027.00	41.2	12	1957-62, 1964
Kortright Creek at East Meredith	01-4979.85	25.6	12	1966-68
Labrador Creek at Truxton	01-5082.00	13.7	7	1962-66
Langford Creek near Van Etten	01-5158.50	5.26	8	1966-68
Latta Brook at Horseheads	01-5304.50	5.26	15	1966-67
Little Choconut Creek at Stella	01-5131.90	12.2	29	1965-69
Little Nanticoke Creek near Owego	01-5138.30	20.7	b/ 7	1962-66
Little Nanticoke Creek on Day Hollow Road near Owego	01-5138.29	19.7	11	1966-67
Little Snake Creek above State Highway 7 at Conklin	01-5028.99	30.6	7	1966-67

Table 3.--Low-flow partial-record stations with summary of measurements through 1969, Susquehanna River basin, New York (Continued)

Stream and location	USGS station number	Drainage area (square miles)	Number of low-flow measurements	Water years in which measurements were made
Little Snake Creek at Conklin	01-5029.00	30.8	b/ e/ 15	1956-62, 1964
Martin Brook near Unadilla	01-5004.95	2.21	a/ 12	1954-55, 1961, 1964-67
Meads Creek at Coopers Plains	01-5298.00	68.5	16	1953, 1956-62, 1965
Merrill Creek at Upper Lisle	01-5107.00	20.9	13	1956-62
Michigan Creek at Campbell	01-5295.50	22.7	13	1956-62, 1965
Middle Brook at North Harpersfield	01-4979.02	12.0	6	1966-68
Mill Brook near Oxford	01-5059.20	13.0	7	1962-66
Mud Creek at Union Valley	01-5098.00	23.8	12	1957-62
Nanticoke Creek at Endicott	01-5138.00	112	16	1953, 1956-62, 1964
Nanticoke Creek at Union Center	01-5137.90	89.7	6	1962, 1964-65, 1968
North Branch Glendenning Creek at Presho	01-5205.20	9.27	13	1966-67
Oak Creek near East Worcester	01-4975.30	5.55	6	1967-68
Occanum Creek at Windsor	01-5027.30	14.4	a/ b/ 6	1962-65
Osborne Creek at Port Crane	01-5126.50	24.9	a/ b/ 7	1962-66
Page Brook near Port Crane	01-5125.50	34.1	8	1962-66
Park Creek near Binghamton	01-5033.00	15.7	b/ 7	1962-66
Patterson Creek at Endwell	01-5134.00	7.03	a/ b/ 7	1962, 1964-65, 1968
Pipe Creek at Tioga Center	01-5148.80	46.5	8	1962-66
Pleasant Brook near Sherburne	01-5048.00	38.6	17	1956-62, 1964
Pond Brook at Smithville Flats	01-5074.90	9.55	a/ b/ 7	1962-66
Pond Creek at Taylor	01-5099.00	7.49	b/ 6	1962-66
Post Creek at Corning	01-5302.00	31.9	15	1956-62, 1965
Sage Creek at Ouaquaga	01-5027.20	13.0	6	1962-65
Sangerfield River near Earlville	01-5047.80	61.4	7	1962-66
Schenevus Creek at Schenevus	01-4978.00	57.8	22	1949, 1956-62, 1964-66
Seeley Creek near Elmira	01-5308.00	144	17	1950, 1956-62, 1964-65
Shellrock Creek near Middlefield	01-4969.20	5.45	6	1966-68
Singsing Creek near Elmira	01-5303.00	21.3	16	1956-62, 1965-66
Snake Creek at Corbettsville	01-5028.00	75.0	b/ 14	1956-62, 1964
South Branch Tuscarora Creek tributary near Woodhull	01-5258.00	7.4	10	1967-68
Spring Brook near Brisben	01-5064.00	17.5	7	1962-66
Sulphur Springs Creek near Spencer	01-5142.98	8.64	8	1966-68
Thomas Creek at Chenango Bridge	01-5127.80	8.69	13	1962-67
Thorn Hollow Creek near Owego	01-5148.20	4.13	18	1966-69
Tillotson Creek near Brisben	01-5063.50	9.65	7	1962-66
Tracy Creek near Vestal	01-5138.10	8.75	a/ b/ 9	1962, 1964-66
Trout Brook near Blodgett Mills	01-5090.20	40.5	7	1962-66
Tuscarora Creek at Damascus	01-5027.40	8.74	b/ 6	1962-65
Wappasening Creek at Nichols	01-5149.00	72.1	a/ b/ 8	1962-66
West Branch Handsome Brook near Franklin	01-4993.00	8.27	7	1964, 1966-68
West Branch Otsdawa Creek near Otego	01-4990.24	6.78	6	1966-67
West Branch Tioughnioga Creek near Cuyler	01-5079.50	35.0	13	1956-60, 1962, 1964
West Branch Tioughnioga River at Cortland	01-5089.80	100	17	1956-62, 1964
Wharton Creek at New Berlin	01-5012.00	89.8	16	1956-62, 1964
Wharton Creek at Pittsfield	01-5011.90	84.4	5	1967-68
Wheeler Brook near Brisben	01-5063.00	10.6	7	1962-66
Willseyville Creek at Willseyville	01-5146.63	8.49	6	1966-67
Wilson Creek near Newark Valley	01-5139.10	15.8	a/ b/ 8	1962-66
Wylie Brook at Harpursville	01-5027.10	24.8	6	1962-65
Wynkoop Creek at Chemung	01-5312.00	33.9	16	1957-62, 1964-65

a/ Insufficient data to develop flow-duration or low-flow frequency relationships; not listed in Appendix A.
b/ This site is in an underflow zone; therefore, the low-flow data cannot be used to estimate flow at sites upstream or downstream from the measuring site.
c/ Combined with 01-5127.97 in this report.
d/ Also nine measurements 1962-68 at Route 8 bridge 800 feet downstream, in underflow zone; not equivalent at flows less than 0.5 cfs.
e/ Not listed in Appendix A; replaced by station 01-5028.99.

VARIABILITY OF STREAMFLOW

Annual Flows

The average flow from the Susquehanna River basin of New York into Pennsylvania was about 10,000 cubic feet per second (283 cubic meters per second) from 1931 to 1960. Of this, 75 percent was contributed by the Susquehanna River and 25 percent by the Chemung River. Mean annual runoff from 1931 to 1960 ranged from 19 to 24 inches (480 to 610 millimeters) east of Owego and from 12 to 18 inches (305 to 460 millimeters) west of Owego. Variation in mean annual runoff across the Susquehanna River basin, shown in figure 11, is mainly due to differences in precipitation.

Runoff also varies from year to year, depending on amount and timing of precipitation and evapotranspiration. The average flow leaving the New York part of the Susquehanna River basin each year from 1938 to 1967 is shown in figure 12. Flow for the year of lowest flow (1965) was about 50 percent of the 30-year average and 30 percent of the flow for the wettest year of record (1943).

Daily Flows

At most stations in the Susquehanna River basin, the lowest daily flow in any given year is about two orders of magnitude less than the highest daily flow. Over a 30-year period, the variation in flow is roughly three orders of magnitude. The distribution of daily flows may be represented by flow-duration statistics, compiled as explained by Searcy (1959) and presented as curves (fig. 13) or tables. In Appendix A of this report, flow-duration tables are presented for each streamflow-measurement station in the basin. The tables include values for the period of record through 1967. (For continuous records shorter than 20 years and for partial-record stations, the period of record is that for a nearby long-term station.) The tables also include values for a 30-year period, 1931-60, which has been designated as a "standard period" by the World Meteorological Organization (Searcy, 1959) to facilitate comparison of hydrologic records. Although the period of record at long-term stations ranged from 20 to 61 years, values for the period of record are consistently lower than values for the standard period because of the addition of the drought years, 1962-67, into the record. An example is shown in figure 14.

The effect of different factors on streamflow may be inferred from the shapes of flow-duration curves. Steep flow-duration curves indicate rapid runoff and lack of storage, if the basins compared have similar climate. For example, the curve for Canisteo River at Arkport is steeper than that for Newtown Creek at Elmira (fig. 13). Canisteo River drains mostly till-covered hillsides and has a steep channel gradient (46 feet per mile, or 8.6 meters per kilometer). Most of the rainfall on steep, till-covered hillsides flows quickly to streams. Newtown Creek has much more sand and gravel along its valley and a more gentle channel gradient (29 feet per mile or 5.4 meters per kilometer) than Canisteo River. Much of the rainfall is stored in sand and gravel; gradually, the stored water reaches streams and prevents flow of Newtown Creek from declining as quickly as the flow of Canisteo River.

The lower part of a flow-duration curve is also affected by the geology at the gaging station. For example, the lower part of the curve for Tuscarora Creek near South Addison (fig. 13) approaches a vertical line because flow ceases at about 98-percent duration. However, analysis based on nearby test-boring logs suggests underflow on the order of 0.2 cubic foot per second (5.7 liters per second); if so, in the absence of underflow, the flow-duration curve would flatten at about 0.002 cubic feet per second per square mile, or 0.02 liters per second per square kilometer. Underflow at the stations on Newtown Creek and Charlotte Creek (fig. 13) is probably greater than that near South Addison on Tuscarora Creek, but the curves for Newtown and Charlotte Creeks do not steepen at the low end because surface flow is large compared to underflow.

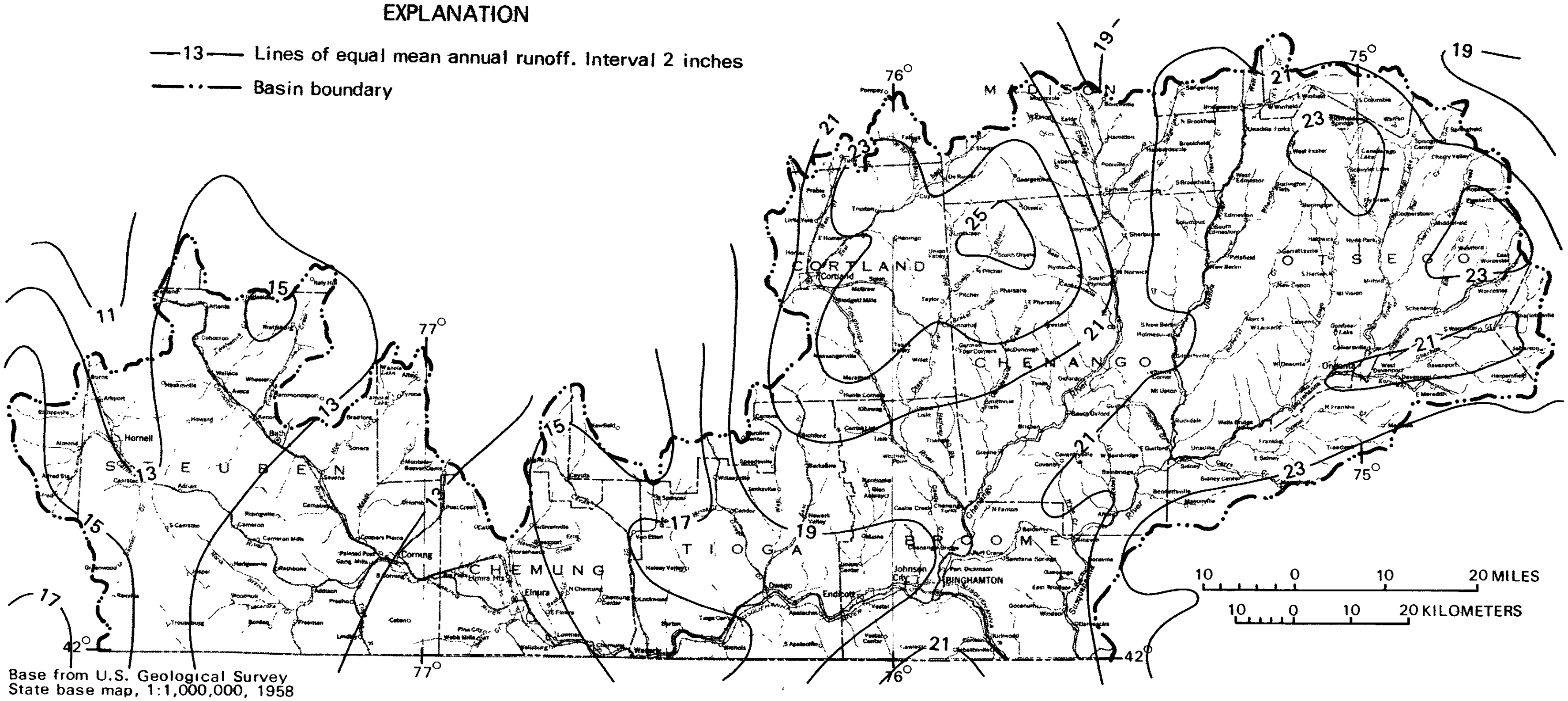


Figure 11.--Mean annual runoff from the Susquehanna River basin, 1931-60. *Multiply inches by 0.074 to obtain cubic feet per second per per square mile. To obtain mean annual runoff for 1931-67, multiply 1931-60 runoff by 0.955.*

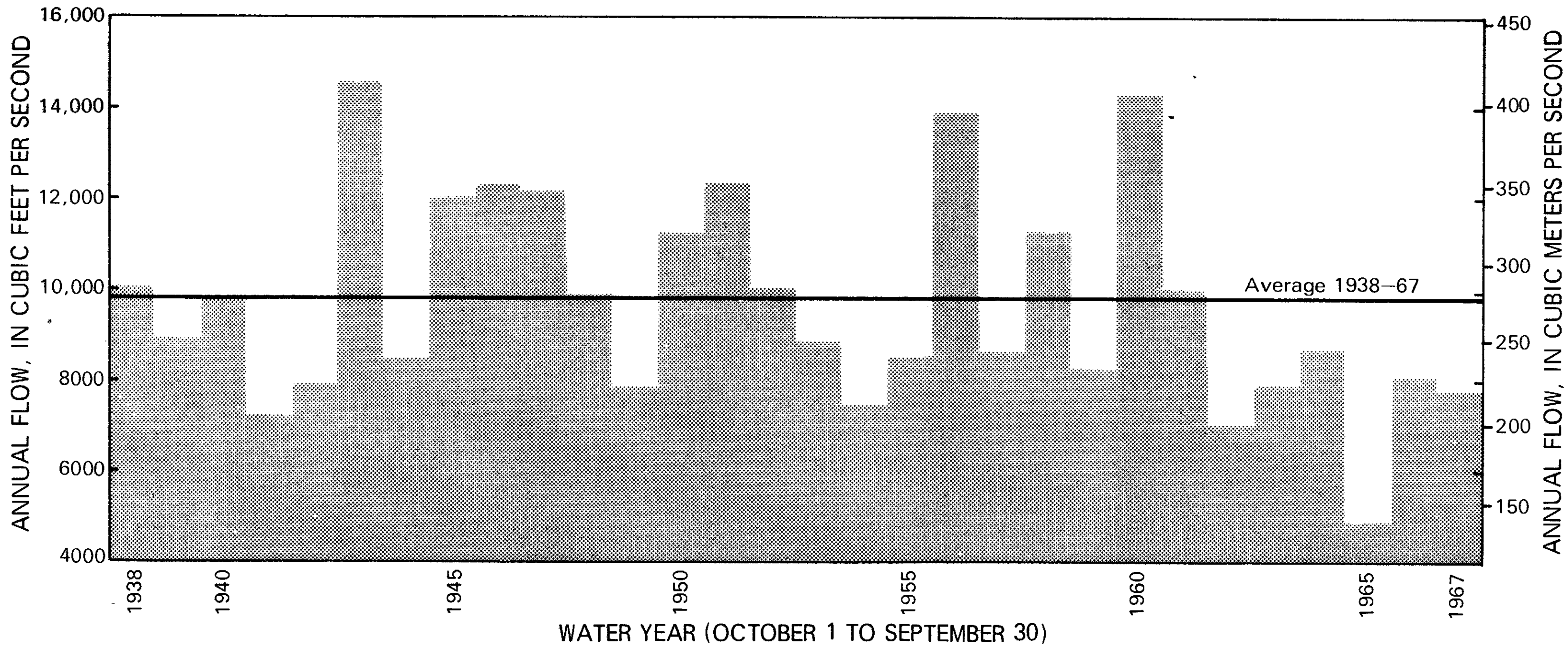


Figure 12.--Variation in annual flow out of the Susquehanna River basin, New York.

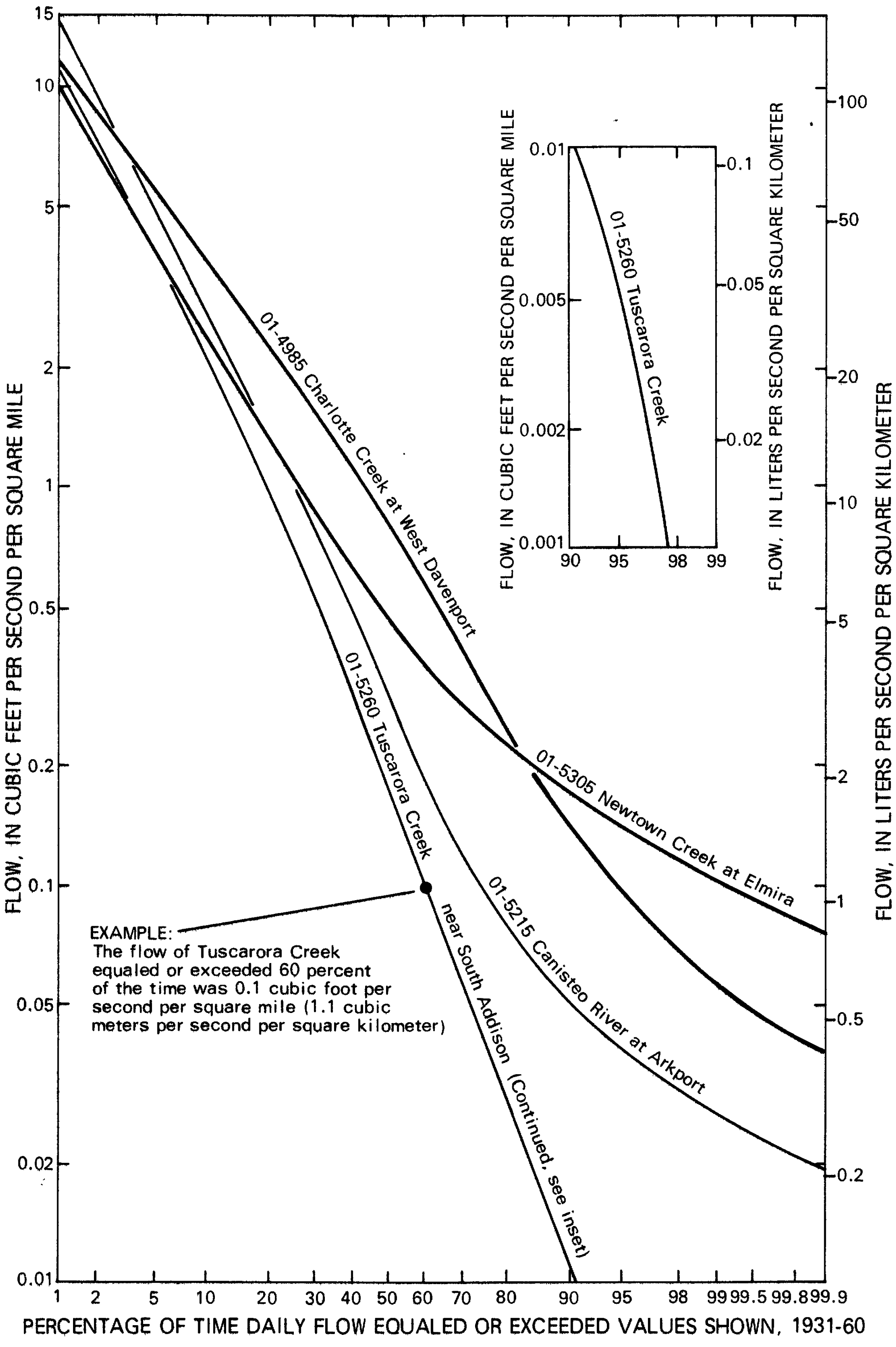


Figure 13.--Flow-duration curves for standard period (1931-60) at selected stations.

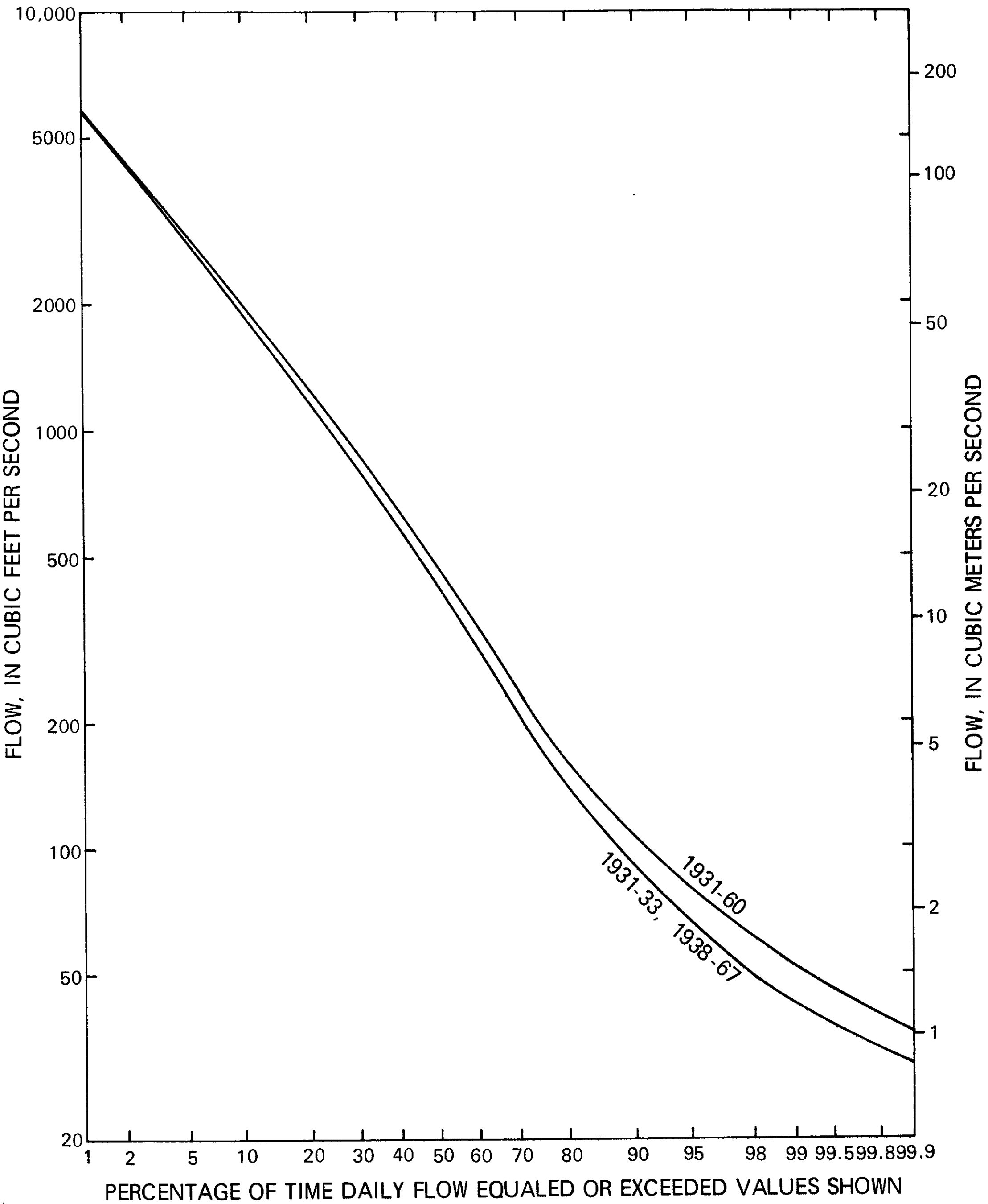


Figure 14.--Flow-duration curves for standard period (1931-60) and for period of record through 1967, Unadilla River at Rockdale (station 01-5025).

LOW-FLOW CHARACTERISTICS

Minimum flow of a stream is important in considering use of the stream for industry, effluent dilution, irrigation, municipal water-supply, or recreation. Measurements at many sites listed in this report were analyzed to estimate how frequently minimum flows averaged over various numbers of days may be expected to recur. The analysis was based on the assumption that the recorded behavior of streams in the past is a reasonable index of their behavior in future periods of comparable length. Where low streamflow seems inadequate to support all proposed uses, these data provide a basis for estimating the surface (or underground) storage needed to augment streamflow.

Analysis at Measurement Stations

Minimum flows averaged for periods of 1, 7, and 30 days were computed for each long-term gaging station in the basin for each year of record. The climatic year, April 1 to March 31, was used because it does not divide the low-flow season as does the water year used in other analyses. Frequency of recurrence of each annual minimum was derived from the formula $RI = \frac{N+1}{m}$, where:

RI = Recurrence interval, in years
N = Number of years of record
m = Rank of each annual minimum flow, where 1 is assigned to the lowest flow

Annual minimum flows having recurrence intervals of 2, 10, and 30 years are presented in Appendix A for each station for periods of record through 1959 and through 1966. For periods of record through 1959, values were taken from curves fitted by eye to the observed data. For periods of record through 1966, values for most stations were taken from a log-Pearson type III curve fitted to the data by computer. For a few stations, where unusual regulation, periods of zero flow, or other special circumstances made the computer fit seem invalid, a curve was fitted by eye. Analyses through 1966 generally represent at least 25 years of record that include an unusually severe drought so should be conservative as indices of future behavior.

The following example is given to illustrate the meaning of the low-flow frequency tables in Appendix A. For Otego Creek near Oneonta (station 01-4990, p. 84), the average flow for the 30 consecutive days of lowest flow in a year is likely to be as low as 8.4 cubic feet per second (240 liters per second) in one year out of ten. This estimate is based on analysis of continuous records from 1941 through 1966. If only the flow records for 1941 through 1959 are used in the analysis, the 30-day low flow with a 10-year recurrence interval becomes 9.5 cubic feet per second (270 liters per second) instead of 8.4 cubic feet per second (240 liters per second).

For partial-record stations and gaging stations having less than 10 years of record, annual low flows for 2, 10, and 30-year recurrence intervals were estimated by correlation methods (Riggs, 1968). Each partial-record station was correlated with at least two nearby stations. Either the average or the correlation with least data scatter was used.

Many of the partial-record stations listed in Appendix A are along small streams a short distance downstream from where the streams begin to cross the sand and gravel fill of large valleys. As noted in the section "Geology and Physiography", tributary streams normally lose water to the ground in such places. Losses of 0.5 cubic feet per second or more per 1,000 linear feet of channel (14 liters per second or more per 300 meters) were indicated by simultaneous measurements a few hundred feet apart along several streams. Casual observation showed that many other streams were dry for long periods in late summer where they entered large valleys, although a short distance upstream they carried small flows. Because of substantial underflow and wide variation in surface flow within a short distance, low-flow-frequency data from underflow zones are valid only for the places at which the measurements were made. Stations in underflow zones are designated as such in Appendix A. Most other partial-record stations are at places where tributary streams flow on till, bedrock, or thin layers of alluvium within their own valleys, so that nearly all basin runoff appears in the stream channel. Low-flow-frequency data from such stations can be applied with reasonable confidence to sites upstream or nearby and can be used in deriving regional low-flow yield, if differences in drainage area and geology are taken into account, as described in the section "Low Flow at Ungaged Sites".

Regional Variation in Low Flow

Yields of streams within the Susquehanna River basin vary widely at low flow. The variation is illustrated by figure 15, a synoptic picture based on streamflow determinations at 64 sites along small streams from August 22 to September 2, 1966, and on concurrent records at gaging stations. Flow of small streams per square mile of drainage area was only 20 percent to one-half of one percent of that recorded in the large streams and was much more variable from place to place. Differences in yield shown in figure 15 can be ascribed to at least five causes:

1. *Time.* Flow declined by 10 to as much as 50 percent at gaging stations during the 12-day period.
2. *Rainfall.* The slightly greater yields observed in the Unadilla, Chenango, and Tioughnioga River basins may reflect the fact that rainfall in early August 1966 was generally heavier there than elsewhere. Scattered showers on August 23, mostly in the northern part of the basin, may have contributed to flow measured at some sites.
3. *Channel storage.* After rainfall ceases, small upland streams quickly return to base-flow conditions; but larger streams take longer, owing to time of travel and channel storage. Therefore, simultaneous streamflow measurements on large and small streams do not necessarily reflect the same flow conditions.

EXPLANATION

Flow of small streams, most of which drain 4 to 30 square miles (10 to 80 square kilometers)

▲.031 Site of measurement, with flow in cubic feet per second per square mile (cfsm); multiply by 11 to obtain liters per second per square kilometer

▲T Flow too small to measure, probably between 0.0002 and 0.001 cfsm

◉ More than 30-percent surficial sand and gravel in basin. All other sites on small streams have less than 10-percent

Flow of large streams, draining more than 100 square miles (260 square kilometers)

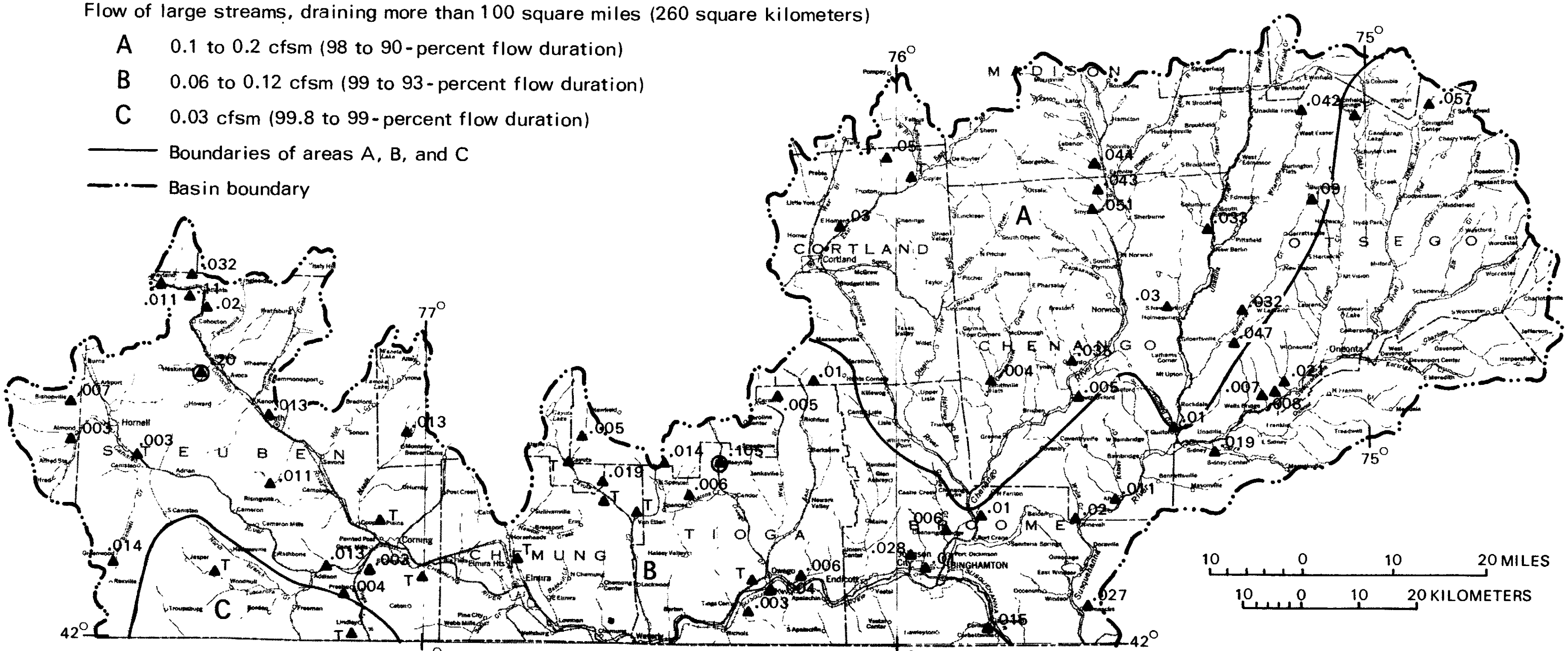
A 0.1 to 0.2 cfsm (98 to 90-percent flow duration)

B 0.06 to 0.12 cfsm (99 to 93-percent flow duration)

C 0.03 cfsm (99.8 to 99-percent flow duration)

——— Boundaries of areas A, B, and C

—·—·— Basin boundary



Base from U.S. Geological Survey
State base map, 1:1,000,000, 1958

Figure 15.--Basin yields during a period of low flow, August 22-September 2, 1966.

4. *Site conditions.* Most sites on small streams were carefully selected to minimize underflow, but a few were not. This resulted in some variation in surface flow from site to site.
5. *Basin characteristics, chiefly the amount of surficial sand and gravel.* Regardless of basin size, unit runoff from basins with large percentages of basin area covered by sand and gravel exceeded unit runoff from nearby basins with small percentages of sand and gravel.

Low Flow at Ungaged Sites

Estimates of low flow are often needed at sites where no streamflow measurements have been made. As suggested by the preceding paragraph, low flows cannot be reliably estimated by extrapolating known flows per unit area from nearby stations. The usual approach is to make a series of measurements under base-flow conditions at sites where information is needed and to develop frequency relationships by comparing these measurements with records at nearby long-term gaging stations. This method was used to estimate flow indices at partial-record stations in Appendix A. However, a disadvantage of this method is that one must wait until climatic conditions are favorable for measurements to be made over a range of base-flow conditions before the magnitude and frequency of low flow can be estimated.

To develop an alternate method of estimating low flows at ungaged sites for this report, several indices of low flow were compared to selected basin characteristics in a regression analysis. As shown by Thomas (1966), for streams in Connecticut, and by Flint (1967), for small streams between Binghamton and Elmira, low flow per square mile increases rapidly as glacial and alluvial sand and gravel increase in percentage of basin area. The same is true for streams throughout the Susquehanna River basin (fig. 16). Such a correlation is logical because low flow of streams is derived almost entirely from ground-water discharge, and surficial deposits of sand and gravel constitute by far the most productive aquifers in the Susquehanna River basin. Boundaries of areas of sand and gravel were delineated on 1:24,000 topographic maps by interpretation of the topographic maps and county soils maps, supplemented by some field reconnaissance and interpretation of aerial photographs. For basins smaller than 200 square miles (520 square kilometers), areas of sand and gravel were measured by planimeter and are probably accurate within 10 percent. For larger basins (not plotted in fig. 16), the percentage of sand and gravel in basin area was estimated by visually scanning the topographic map in comparison with subbasins whose percentage area of sand and gravel had been measured.

As implied by Thomas (1966), low flow should also reflect variations from place to place in average precipitation and runoff. Low flow was found to be more significantly correlated with mean runoff (fig. 11) than with mean annual precipitation (fig. 3) or frost-free precipitation.

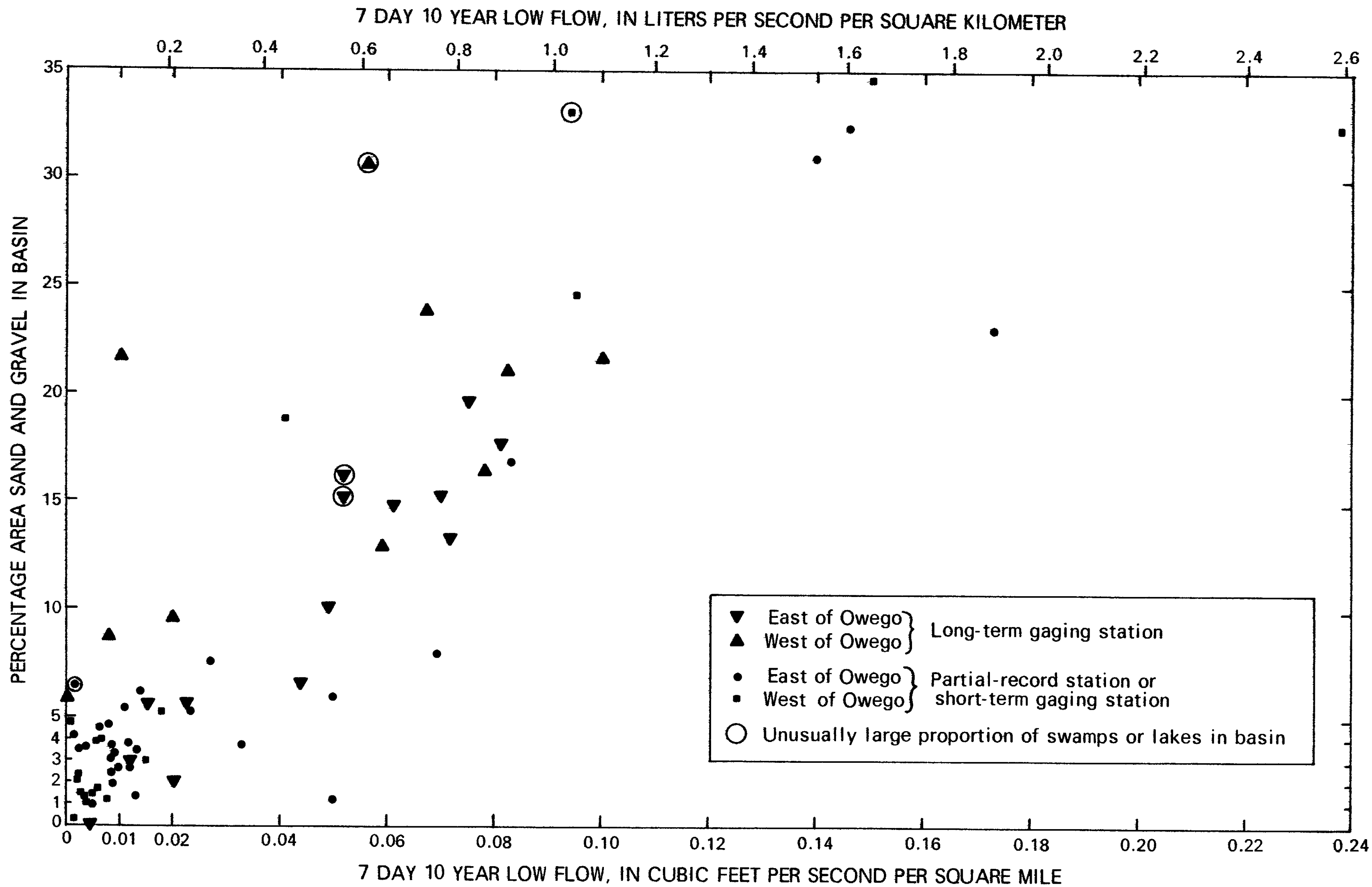


Figure 16.--Relation of low flow to percentage area sand and gravel in basin.

Several other basin characteristics were tested, but none was found to be generally significant at the 5-percent level. Basin characteristics are defined and their values at measurement stations are listed in Appendix B.

Regression analyses were run with natural values of the variables and also with logarithmic transformations to normalize flow data. Results are summarized in table 4. The major importance of sand and gravel may be seen by comparing equations 1 and 2 in the table. The equations in the table are based on 73 stations, each of which represents a drainage basin of less than 200 square miles (520 square kilometers) in which the area of sand and gravel was measured as previously described. Of these, 47 were partial-record stations. Addition of basins larger than 200 square miles (520 square kilometers) generally caused a slight increase in the correlation coefficient and a slight reduction in standard error. However, the resulting equations are less reliable than those in table 4 because percentage area of sand and gravel in the larger basins was estimated and because the equations are needed chiefly to estimate flow from small basins or small increments within large gaged basins. Correlation coefficients listed in table 4 suggest that the error in estimating low flow per square mile from most of these equations would average about 50 percent of the error resulting from using the mean of low-flow values at all stations (Beard, 1962, p. 46). The standard errors of estimate listed in table 4 are substantial on a percentage basis; if data are normally distributed, two of three low-flow indices estimated from these equations should depart from the true indices by less than the standard error. However, the equations in table 4 probably predict low flows more reliably than either of these statistical tests suggest. Random errors in the data used, particularly in low-flow indices estimated for the many partial-record stations, artificially increase the departure of data points from the regression equation; hence, statistical measures of unreliability are exaggerated (Beard, 1962, p. 49). Nevertheless, magnitude and pattern of residual errors (table 4 and fig. 16) suggest that factors not accounted for in table 4 influence low flows significantly and that further study could improve estimates of low flows. Areas of lakes and swamps, a basin characteristic not tested, may have a significant effect on low flow because of intense evapotranspiration there, as suggested by several points in figure 16. Underflow is near zero at some stations but could easily be several tenths of a cubic foot per second at stations in large valleys; variations in underflow may be responsible for some scatter of data. In conclusion, the equations in table 4 are useful, but analysis of base-flow measurements is a more reliable method of estimating low flow if eight or more measurements can be obtained at the site of interest under suitable flow conditions and if the correlation of those measurements with a nearby long-term station(s) has less error than the equations in table 4.

Most of the stations established in this study on upland streams are in channel reaches underlain by till or bedrock, where underflow is at a minimum. Many other reaches of upland streams are underlain by thin but moderately permeable alluvium that can transmit significant underflow. During periods of low flow, the reaches underlain by alluvium may be dry or may carry flows smaller than expected from equations in table 4 or from data for stations in Appendix A that are not noted as being in underflow zones. On the average, however, the full low-flow yield should be available along any upland stream from a shallow infiltration gallery dug across the valley (fig. 17), if not from the channel itself.

Table 4. - Low-flow regression equations, Susquehanna River basin, New York

[SG, percentage area of sand and gravel in basin, expressed as decimal (for 20 percent, use 0.20); MQ, mean runoff, in cubic feet per second per square mile; and VS, valley slope, between measurement site and a point 10 percent of the distance from basin divide to site, dimensionless.]

Equation number	Low-flow index (1931-60) in cubic feet per second per square mile	Equation a/	Multiple correlation coefficient	Standard error of estimate: Cubic feet per second per square mile	Standard error of estimate: Percentage of mean and median of dependent variable: Mean	Standard error of estimate: Percentage of mean and median of dependent variable: Median	Standard error of estimate: Percentage of individual predicted values of dependent variable
(1)	7-day 10-yr low flow	$= -0.03 + 0.432\ SG + 0.0187\ MQ$	0.864	0.024	64	170	--
(2)		$= -0.0033 + 0.426\ SG$	.857	.0245	65	175	--
(3)		$= 0.168\ SG^{1.01}\ MQ^{1.67}$	.773	--	--	--	112
(4)	7-day 2-yr low flow	$= -0.062 + 0.657\ SG + 0.048\ MQ$	.877	.035	50	83	--
(5)		$= 0.781\ SG^{1.31}\ MQ^{1.69}\ VS^{-0.69}$	.886	--	--	--	129
(6)	90 percent flow duration	$= -0.11 + 0.726\ SG + 0.094\ MQ$	.865	.042	46	73	--
(7)		$= 0.235\ SG^{0.73}\ MQ^{2.11}$	.839	--	--	--	64

a/ Regression coefficients are significant at the 1- or 5-percent levels.

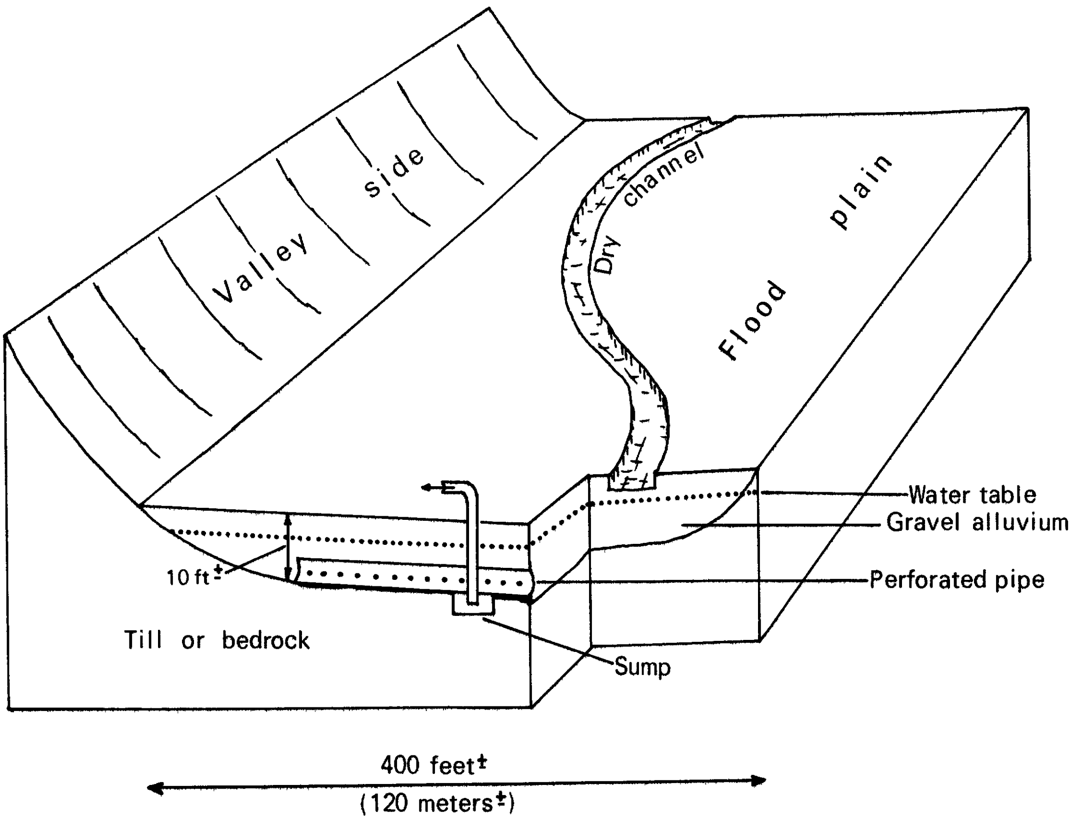


Figure 17.--Infiltration gallery for tapping underflow along upland streams.

Drought of the 1960's

The drought of the early 1960's in northeastern United States (Barksdale and others, 1966) was an important event in the hydrologic history of the Susquehanna River basin. During this drought, record minimum 1-day flows were set or equaled at 15 of 37 long-term gaging stations; and record minimum average flows for one or more periods up to 183 days were set at 26 of these stations. Many reaches of small streams were dry for many weeks. The average flow for the Susquehanna River basin for the 1965 water year (specifically, the sum of average flows at stations 01-5150 and 01-5310) was 4,900 cubic feet per second (140 cubic meters per second), the lowest since records began at station 01-5150 in 1938 and only about two-thirds of the minimum previously recorded.

Perhaps the outstanding feature of the years 1962-67, even more remarkable than the occasional episodes of record-low flow during this period, was the persistence of subnormal precipitation and runoff for so long a period over so large an area. The cumulative deficiency equaled about 1½ years normal runoff, as illustrated for Owego Creek and Genegantslet Creek in figure 5B. At every gaging station in the Susquehanna River basin, values of flow duration for the period of record through 1967 (Appendix A) are smaller than corresponding flow-duration values for the period of record through 1960 (Hunt, 1967). At a few stations, there was no change in

magnitude of the small flows exceeded more than 99 percent of the time. Furthermore, extending the statistical array of annual low flows at each station from 1959 to 1966 results in generally smaller indices of low-flow frequency (Appendix A), but not for every recurrence interval at every station because local intense summer droughts in previous years are also included in the record.

STORAGE

Half the annual volume of flow carried by streams in the Susquehanna River basin leaves the basin in March, April, and early May. The other half is distributed unevenly over the rest of the year. Hence, there may be places where streamflow will be unable to supply local demand at times during late summer and fall, although the annual volume of flow is far greater than demand.

Demand that temporarily exceeds local water supply could be met by storing water in surface and (or) underground reservoirs during periods of excess streamflow. The volume of storage required to sustain various rates of demand may be estimated for any site in the Susquehanna River basin from analysis of streamflow records. Such an analysis, adapted from R. M. Beall (written commun., 1968), is presented in the following two sections.

Storage Required at Gaging Stations

The traditional method of calculating storage requirements utilizes a mass curve of cumulative streamflow volume, ideally derived from a gaging-station record at the site of interest. Any desired draft rate may be represented by lines of appropriate slope that span periods of low streamflow shown by the mass curve. The maximum departure from the mass curve indicates the maximum storage volume that would have been required to satisfy the desired draft rate during the period studied.

The mass-curve method was applied at 19 gaging stations in the Susquehanna River basin that had 20 years of record through 1964. Storage volumes that would have been required to meet a variety of draft rates in each year were determined by this method. These annual storage volumes were then used to define draft-storage-frequency curves for the individual stations, such as those shown in figure 18 for Owego Creek. Frequency analysis of annual storage volumes is valid for draft rates less than the lowest annual mean flow in the period of record. For such draft rates, storage could have been replenished within every year. However, analysis of annual storage is not valid for draft rates greater than the lowest annual mean flow in the period of record.

To sustain larger draft rates, water must be stored during wet years for carryover and release during dry years. Hardison (1966) adapted the queing theory to the computation of carryover storage requirements by a probability routing based on the cumulative frequency distribution of annual flows. Beall (1968) summarized Hardison's method of analysis and applied it to the Erie-Niagara basin. Beall later computed gross storage requirements (seasonal storage plus carryover storage as required) for each long-term gaging station in the Susquehanna River basin (table 5). Considerations of risk or probability were incorporated by developing storage requirements for 2-, 5-, and 10-percent chance of deficiency (equivalent, respectively, to 50-, 20-, and 10-year recurrence intervals). The carryover storage computations are based on the assumption that draft rates are constant, flow is uniform within each year, and total flow for any year is independent of

Table 5. -- Draft-storage frequency at long-term gaging stations, Susquehanna River basin, New York
(Data in this table are based on streamflow records through 1964)

USGS station number and name	7-day 2-year low flow in percent of mean flow	Percentage chance of deficiency	Gross storage capacity required, in percent of mean annual flow volume: 0	1	5	10	20	30	40	50	60	70	80	100	Draft at which carryover is required
			Table values are allowable draft in percent of mean flow.												
01-4965.00	7.0	2	0.6	2.5	10.5	19.0	34.0	46.5	56.5	65.0	72.5	79.0	83.0	88.5	51
Oaks Creek		5	1.1	5.0	13.5	23.5	40.0	53.0	64.0	73.0	79.5	84.5	88.5	93.5	58
at Index		10	1.8	7.0	17.0	28.5	47.5	61.0	71.5	79.0	84.0	89.0	91.5	95.5	69
01-4975.00	9.3	2	1.3	6.5	14.5	23.5	39.0	51.0	60.5	69.5	76.5	82.0	85.5	90.5	54
Susquehanna River		5	2.2	7.5	17.0	27.0	43.0	55.5	65.0	74.0	81.5	86.5	90.0	93.5	60
at Colliersville		10	3.0	10.5	21.0	31.5	49.5	62.5	72.5	80.0	85.5	90.0	92.5	96.0	71
01-4985.00	6.2	2	1.6	5.5	13.0	22.5	39.0	53.0	63.5	71.5	77.5	82.5	86.0	91.0	55
Charlotte Creek		5	2.4	7.5	16.5	27.5	45.5	59.0	69.5	77.5	83.5	88.0	90.5	93.5	60
at West Davenport		10	3.3	9.0	20.0	32.0	50.5	65.0	75.0	81.5	86.5	90.5	93.5	96.5	71
01-4990.00	7.5	2	3.0	7.0	14.0	23.0	40.5	55.5	64.0	72.0	78.0	83.0	86.5	90.5	54
Otego Creek near		5	3.5	8.0	17.5	28.5	47.5	61.5	69.5	77.0	83.0	87.5	90.5	93.0	61
Oneonta		10	4.1	10.0	21.0	32.5	52.5	67.0	76.0	82.0	87.0	90.5	93.0	96.0	71
01-5000.00	5.5	2	.8	4.0	13.0	21.0	36.5	51.5	61.0	68.5	75.5	81.0	84.5	89.5	52
Ouleout Creek		5	1.4	7.0	15.5	24.5	42.5	58.0	66.5	73.5	80.0	85.0	89.0	92.5	60
at East Sidney		10	2.0	9.0	18.5	29.0	48.0	64.D	74.5	81.0	86.0	89.5	92.5	96.0	70
01-5005.00	9.4	2	3.2	8.0	15.5	23.5	38.5	52.5	63.0	71.0	77.0	82.0	85.5	90.0	51
Susquehanna River		5	4.2	10.0	19.5	29.5	46.0	60.0	68.5	76.0	82.5	87.0	90.0	93.0	60
at Unadilla		10	4.7	11.0	22.5	33.5	51.5	67.0	75.5	82.0	86.5	90.0	93.0	96.0	70
01-5010.00	7.2	2	2.9	8.0	16.5	24.0	36.5	48.0	59.0	69.0	77.5	83.5	88.0	92.5	58
Unadilla River		5	4.2	9.0	18.0	26.5	41.5	55.0	67.0	76.5	84.0	88.5	91.5	94.5	63
near New Berlin		10	4.7	9.5	20.0	30.0	47.5	62.5	75.5	83.0	88.0	91.5	94.0	97.0	72
01-5015.00	1.5	2	0	2.5	11.5	20.5	36.0	49.5	60.5	68.5	75.5	81.0	84.5	89.5	60
Sage Brook near		5	.05	3.5	12.0	21.5	39.5	54.5	68.5	78.0	83.5	87.0	89.5	93.5	68
South New Berlin		10	.2	4.8	15.0	25.5	43.5	59.5	74.0	82.0	87.0	90.5	93.0	95.5	71
01-5020.00	6.9	2	2.5	6.0	14.5	22.5	36.0	48.5	60.0	69.5	76.5	82.5	86.5	91.0	56
Butternut Creek		5	3.1	9.0	18.0	27.5	43.0	56.5	68.0	76.0	83.0	88.0	91.0	93.5	62
at Morris		10	3.9	10.0	21.0	31.0	49.0	64.5	75.5	82.0	87.5	91.0	93.5	96.5	69
01-5025.00	8.6	2	3.1	7.0	15.5	24.0	39.0	52.0	63.0	70.5	76.5	81.5	85.5	89.5	60
Unadilla River		5	3.9	9.0	18.0	27.5	43.0	57.0	70.5	79.0	84.5	87.5	90.0	93.0	68
at Rockdale		10	4.9	10.5	21.0	31.5	49.0	64.0	76.0	82.0	86.5	90.5	93.0	96.0	74
01-5030.00	8.7	2	3.2	8.0	16.5	25.0	40.5	55.0	65.0	73.0	80.0	85.0	88.5	92.5	59
Susquehanna River		5	4.2	10.0	20.0	30.0	46.5	61.5	71.5	79.0	85.0	89.0	91.5	94.0	64
at Conklin		10	5.0	11.5	24.0	35.5	53.5	70.0	78.5	85.0	89.0	92.0	94.5	97.0	70
01-5050.00	10.2	2	3.8	9.0	18.5	27.0	41.0	50.0	57.5	65.0	71.5	78.0	82.0	86.0	45
Chenango River		5	4.2	10.0	20.0	29.5	44.5	57.5	65.0	71.5	77.0	81.5	85.0	90.5	57
at Sherburne		10	4.8	11.0	22.5	32.0	48.5	62.0	71.5	76.5	81.5	85.5	89.0	94.0	69
01-5070.00	8.8	2	4.2	7.5	16.5	25.0	39.0	51.5	61.5	70.0	76.5	81.5	85.5	90.0	53
Chenango River		5	4.9	9.5	18.5	28.0	43.5	57.0	66.5	75.0	81.0	86.0	89.5	93.0	60
at Greene		10	5.6	11.5	22.0	31.5	48.0	62.0	73.5	80.0	85.0	89.0	92.5	96.0	71
01-5075.00	4.0	2	1.0	3.6	13.0	21.0	35.0	47.5	58.0	66.5	74.0	79.5	83.5	89.0	52
Genegantslet Creek		5	1.2	5.0	14.0	23.5	40.0	53.5	63.5	71.5	78.5	85.0	89.0	92.5	60
at Smithville Flats		10	1.5	6.5	16.5	26.5	44.0	58.0	70.0	78.0	84.5	89.0	92.0	95.5	70
01-5080.00	2.2	2	.4	4.5	13.5	22.5	38.0	52.5	62.0	68.0	74.0	79.5	83.0	87.5	59
Shackham Brook		5	.6	5.0	14.5	24.0	40.0	54.5	68.0	77.0	82.0	85.5	88.0	92.0	64
near Truxton		10	.8	5.5	15.5	26.0	43.5	59.0	72.D	79.0	85.0	89.0	91.5	95.0	71
01-5085.00	2.6	2	0	5.5	15.5	24.5	40.0	54.0	65.5	73.5	79.0	83.5	86.5	90.5	60
Albright Creek		5	.1	6.0	16.0	26.0	43.0	58.0	72.0	80.5	84.5	88.0	91.0	94.5	72
at East Homer		10	.3	6.5	17.5	27.5	46.0	63.0	77.0	84.0	88.5	92.0	94.0	97.0	76

Table 5. -- Draft-storage frequency at long-term gaging stations, Susquehanna River basin, New York (Continued)
(Data in this table are based on streamflow records through 1964)

USGS station number and name	7-day 2-year low flow in percent of mean flow	Percentage chance of deficiency	Gross storage capacity required, in percent of mean annual flow volume: 0	1	5	10	20	30	40	50	60	70	80	100	Draft at which carryover is required
			Table values are allowable draft in percent of mean flow.												
01-5090.00	10.3	2	4.9	10.0	19.0	27.5	42.5	55.5	66.5	74.0	79.5	83.5	86.5	90.5	61
Tioughnioga River		5	5.7	10.5	20.5	29.0	45.0	59.5	73.0	80.5	85.0	88.5	91.0	94.5	70
at Cortland		10	6.5	12.0	22.0	32.0	49.0	65.0	78.0	84.5	88.5	91.5	94.0	97.0	75
01-5105.00	6.9	2	1.9	7.0	16.0	25.5	41.5	53.5	62.5	70.5	77.0	82.5	86.0	90.0	61
Otselic River		5	2.5	7.5	17.5	27.5	43.5	57.0	69.0	77.0	83.0	87.0	90.0	94.0	69
near Upper Lisle		10	3.2	8.5	19.0	29.5	47.5	62.0	74.0	82.5	88.0	91.5	93.5	96.5	74
01-5115.00	7.9	2	3.6	9.0	18.5	27.5	42.0	54.5	65.0	72.5	78.5	83.0	86.5	90.5	61
Tioughnioga River		5	4.1	10.0	20.0	29.5	45.5	59.5	73.5	81.5	85.5	88.5	90.5	94.0	69
at Itaska		10	4.6	11.0	22.5	33.0	49.5	64.5	77.5	84.0	88.5	91.5	93.5	96.5	73
01-5125.00	10.4	2	3.9	9.0	18.5	27.5	42.0	55.0	66.0	74.5	81.0	85.5	89.0	92.0	58
Chenango River near		5	4.8	10.5	21.0	30.5	46.0	60.5	72.0	79.5	85.5	89.5	92.0	94.5	65
Chenango Forks		10	5.6	12.0	23.5	34.0	52.0	68.0	78.0	84.5	89.0	92.5	94.5	97.0	72
01-5140.00	5.5	2	3.2	6.5	15.5	24.5	39.5	53.5	63.0	70.0	76.0	81.0	84.0	89.0	60
Owego Creek		5	3.8	7.5	17.5	27.0	42.5	56.0	68.5	78.0	83.0	86.5	89.0	93.0	67
near Owego		10	4.0	8.0	18.5	28.5	45.5	60.5	73.0	81.5	86.5	90.0	92.5	95.5	71
01-5150.00	8.2	2	3.4	8.0	17.0	26.0	41.0	54.0	64.0	71.5	77.5	82.0	85.5	90.0	52
Susquehanna River		5	4.1	9.0	19.0	29.0	45.0	59.0	68.5	76.5	82.5	87.0	90.0	93.0	60
near Waverly		10	4.6	11.0	22.0	33.0	51.0	65.5	75.0	81.5	86.5	90.0	92.5	96.0	69
01-5205.00	4.5	2	1.0	5.5	12.5	20.5	33.5	44.5	52.0	59.0	65.5	71.0	75.5	82.5	43
Tioga River		5	1.5	6.0	14.5	23.0	37.5	51.0	58.5	65.0	71.0	76.0	81.0	88.0	54
at Lindley		10	1.9	7.0	17.0	26.0	42.0	57.0	67.0	74.0	79.5	84.0	87.5	92.0	63
01-5215.00	3.6	2	1.8	5.5	12.5	20.0	34.0	47.0	59.0	65.0	70.5	76.5	81.5	87.5	59
Canisteo River		5	1.8	6.0	13.5	22.0	38.0	52.0	64.5	74.5	80.0	84.0	87.0	91.0	65
at Arkport		10	1.8	6.5	15.0	24.5	41.5	56.5	69.5	77.0	83.5	87.5	90.5	94.0	70
01-5225.00	2.0	2	0	4.5	11.5	19.0	34.5	48.5	59.0	65.0	70.0	75.0	79.5	85.5	59
Karr Valley Creek		5	.2	5.0	12.5	21.0	36.5	50.5	63.5	72.0	78.5	82.5	85.5	90.0	64
at Almond		10	.4	5.5	14.0	22.5	38.5	53.5	67.5	75.5	82.0	86.5	89.5	93.0	69
01-5255.00	7.3	2	2.9	9.5	18.0	26.5	40.5	53.0	61.0	66.0	71.0	75.0	79.0	84.5	55
Canisteo River		5	4.4	10.0	18.5	27.0	42.5	56.5	66.5	73.5	78.5	82.0	85.0	89.0	60
at West Cameron		10	5.3	11.0	20.0	29.0	45.0	59.0	69.5	75.0	80.5	85.5	88.5	92.5	66
01-5260.00	0.6	2	0	2.3	9.5	16.5	29.0	40.5	51.5	58.5	64.0	68.0	71.5	77.0	44
Tuscarora Creek near		5	0	2.4	10.0	18.0	31.5	43.5	55.0	63.5	69.5	74.5	78.0	83.5	51
South Addison		10	0	3.1	11.0	19.0	33.5	47.0	60.0	67.5	73.5	78.0	81.5	87.5	54
01-5265.00	5.1	2	1.6	6.9	15.0	23.0	37.0	48.0	56.0	62.0	67.0	71.0	75.0	81.0	37
Tioga River		5	2.3	7.5	16.5	25.5	41.5	54.5	62.5	69.0	74.0	78.0	81.5	87.5	52
near Erwins		10	2.8	8.3	18.5	28.5	45.5	60.0	68.5	74.0	78.5	82.0	85.5	91.0	65
01-5280.00	2.3	2	.5	4.0	11.0	18.5	31.5	44.0	55.5	63.0	68.5	73.0	77.5	83.5	55
Fivemile Creek		5	.9	5.0	12.5	19.5	33.5	46.5	59.0	70.0	76.5	81.0	84.5	89.0	59
near Kanona		10	1.1	5.5	13.5	21.5	36.0	49.0	61.0	72.5	79.0	84.5	88.0	92.5	62
01-5295.00	8.9	2	2.3	9.0	17.5	25.0	39.5	52.5	61.0	66.0	71.0	75.0	79.0	84.0	57
Cohocton River		5	3.6	10.0	19.0	28.0	42.5	55.5	66.0	73.0	78.0	82.5	85.0	89.0	62
near Campbell		10	5.0	11.0	20.0	29.0	45.0	59.0	69.5	75.5	81.0	85.5	89.0	92.5	68
01-5305.00	13.5	2	5.7	11.0	20.0	29.0	41.0	49.0	56.0	62.5	68.5	73.5	78.0	84.0	39
Newtown Creek		5	6.8	12.7	21.5	30.5	45.0	57.0	65.0	70.5	75.5	79.5	82.5	88.0	54
at Elmira		10	7.8	14.6	24.0	34.0	49.5	60.0	67.5	73.0	77.5	81.5	85.0	91.5	66
01-5310.00	6.5	2	3.0	7.5	15.5	24.0	38.5	46.5	54.0	61.0	68.0	73.5	78.0	84.0	39
Chemung River		5	3.2	8.5	18.0	27.0	42.0	54.5	63.0	69.5	74.5	79.0	82.5	88.0	54
at Chemung		10	3.5	9.5	20.0	30.0	45.5	59.5	69.0	74.5	79.0	83.0	86.0	91.0	66

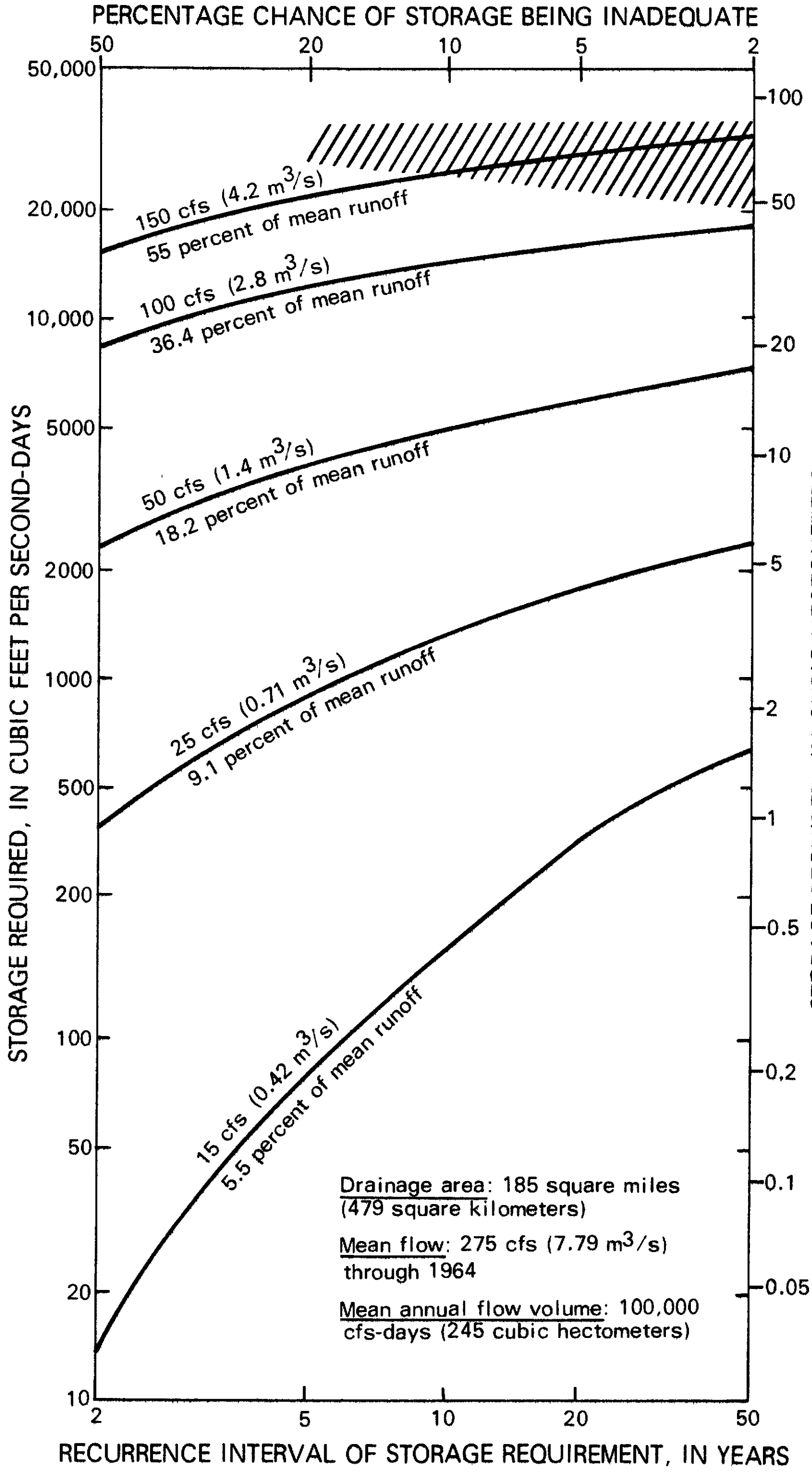


Figure 18.--Magnitude and frequency of seasonal storage requirements, Owego Creek near Owego, 1931-64 climatic years (April 1 to March 31). *Seasonal (within-year) storage is inadequate above the base of the hachured area.*

the previous year's flow. If annual flows in successive years are serially correlated (that is, not independent) the aftereffects of droughts will tend to persist, and the allowable draft for a given amount of storage will be somewhat less than indicated by these computations. According to a method of analysis suggested by Hardison (1966, fig. 23), the average reduction in allowable draft due to serial correlation would be about 2 percent of the mean flow for typical New York streams. This may be subtracted from values of allowable draft larger than those in the last column of table 5.

Regional Draft-Storage Relationships

Differences from one locality to another in storage required to sustain a given draft rate closely reflect differences in seasonal low flows and in annual flows, which have already been discussed and explained in terms of climatic and geologic factors. Accordingly, a regional draft-storage relationship based on these flow statistics was prepared. The effects of differences in basin size, annual precipitation, and evapotranspiration on storage and draft parameters were largely eliminated by expressing these parameters as percentages of mean flow for each of the gaging stations listed in table 5. Remaining variations at large draft rates were handled by dividing the basin into two regions (fig. 19). To account for local physiographic factors, the parameters were related to the 7-day 2-year low-flow statistic, which is a suitable index of within-year flow variation in humid areas (Riggs, 1966). The results are presented in table 6.

Thus, storage requirements at any site in the Susquehanna River basin may be estimated in six steps:

1. Determine the 7-day 2-year low flow at the site of interest from Appendix A for basins above measurement stations and from table 4 for ungaged basins or incremental areas.
2. Determine the mean flow from Appendix A or figure 11.
3. Convert the low flow to percentage of mean flow.
4. Note the region in which the site is located (fig. 19).
5. Determine the draft rate (or the storage volume) desired and convert to percentage of mean flow (or of mean annual flow volume). Mean flow in cubic feet per second x 724 = mean annual flow volume in acre-feet.
6. Use table 6 to determine the storage required (or allowable draft) for the desired chance of deficiency. For sites at long-term gaging stations, use table 5 instead of table 6.

The following two examples show how to estimate storage requirements. Both examples refer to a site on Castle Creek at Glen Castle (station 01-5127.97), for which pertinent flow statistics were first determined as follows:

7-day 2-year low flow = 0.4 cubic feet per second (from Appendix A)
Mean flow = about 19 inches or 1.4 cubic feet per second per square mile
(1931-60, from fig. 11) x drainage area of 27.7 square miles
= 39 cubic feet per second
Mean annual flow volume = 39 cubic feet per second x 724 = 28,200 acre-feet
7-day 2-year low flow as percent of mean flow = (0.4/39) (100) = 1 percent
Region C (from fig. 19)

Example 1: A draft rate of 11.7 cubic feet per second is desired at this site and a 5 percent chance of deficiency is acceptable. How much storage is required? Convert draft rate to percentage of mean flow (11.7/39 = 30 percent) and enter table 6 as follows:

A 7-day 2-year low flow of 1 percent of mean flow falls between low flows of 0 percent and 5 percent in the first column of table 6.

For a low flow of 5 percent and a chance of deficiency of 5 percent, draft rates lie in the 5th row of data, under region C. A draft rate of 25.0 percent requires storage of 10 percent, and a draft rate of 40.5 percent requires storage of 20 percent, so by interpolation a draft rate of 30 percent requires about 13 percent storage.

For a low flow of 0 percent, a draft rate of 30 percent requires about 21 percent storage.

For a low flow of 1 percent, therefore, storage required is between 13 and 21 percent, or by interpolation about 19.5 percent, of mean annual flow volume. Taking 19.5 percent of 28,200 = 5,500 acre-feet (6.8 cubic hectometers) of storage required.

Example 2: A reservoir proposed for this site will store 11,300 acre feet and a 5 percent chance of deficiency is acceptable; what is the allowable draft? Convert storage to percentage of mean annual flow volume, (11,300/28,200 = 40 percent) and enter table 6 as follows:

For a low flow of 5 percent of mean flow and a chance of deficiency of 5 percent, 40 percent storage permits 60.5 percent draft.

For a low flow of 0 percent, 40 percent storage permits 55 percent draft.

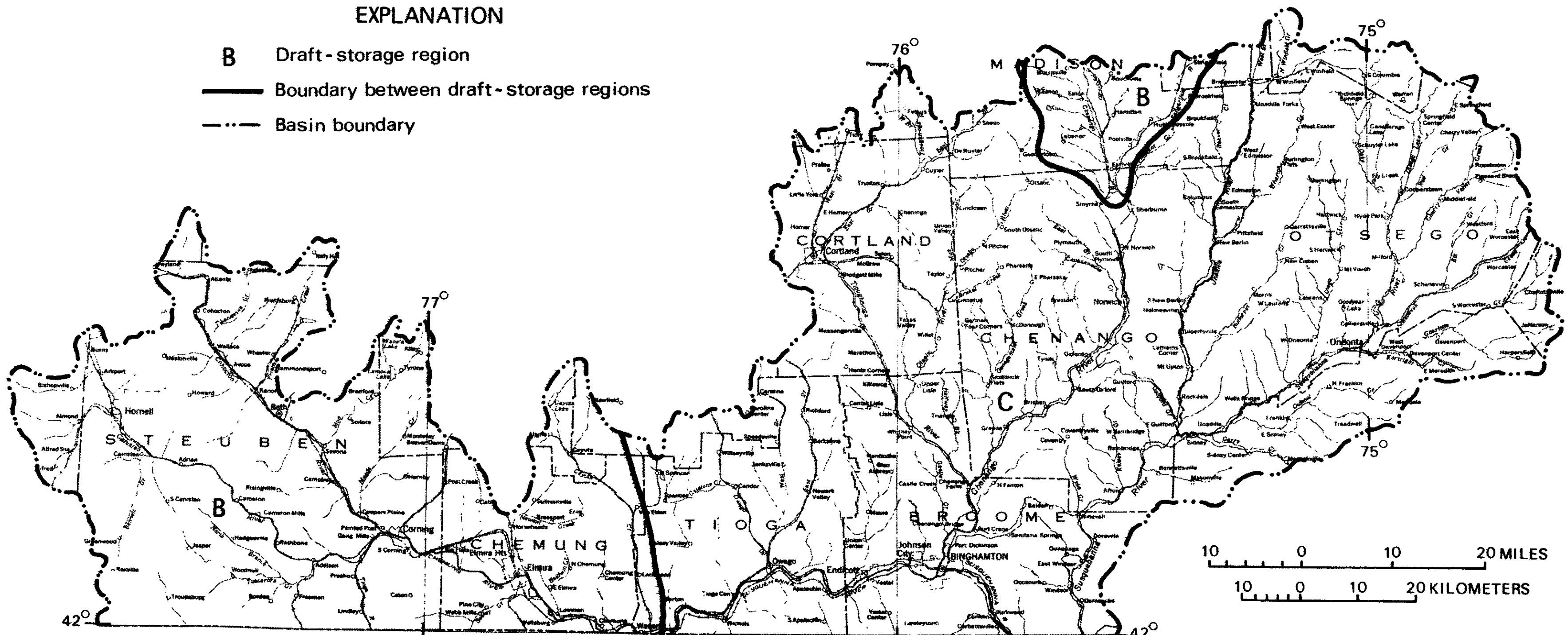
Thus, by interpolation, at this site where 7-day 2-year low flow is 1 percent of mean flow, 40 percent storage permits 56 percent draft. Multiplying 56 percent by mean flow of 39 cubic feet per second = 22 cubic feet per second (620 liters per second) which is the allowable draft.

Complete design of a storage project must, of course, consider many factors in addition to the streamflow characteristics of a particular site. These include pattern of draft, evaporation from a surface reservoir, reduction in reservoir capacity due to sedimentation, economic consequences of a temporary storage deficiency, chemical and biological water-quality factors, and suitability of the proposed site for dam construction (or storage capacity and architecture of the proposed underground reservoir). These other factors, although important in final design of a storage project, are beyond the scope of this study and are not included in the results reported here. The upper limit of storage development shown in table 6 is equal to the mean annual flow volume and provides, in region C at a 2 percent chance of deficiency, a gross allowable draft of 88 to 92 percent of mean runoff. Net yields, allowing for effects of serial correlation, seepage and evaporation losses, and variable draft rates, would be on the order of 10 to 20 percent smaller than the gross draft rates shown.

Table 6.--Regional draft-storage frequency, Susquehanna River basin, New York

7-day 2-year low flow in percent of mean flow	Percentage chance of deficiency	REGION B									
		Storage required, in percent of mean annual flow volume									
		0	5	10	20	30	40	50	60	80	100
		Table values are allowable draft, in percent of mean annual flow.									
0	2	0	6.5	13.0	25.0	36.5	47.0	56.0	62.0	70.5	77.0
	5	0	8.0	15.5	29.0	41.0	53.5	63.5	68.5	76.5	83.0
	10	0	10.0	18.0	32.5	46.5	60.0	69.0	73.5	81.0	87.0
5	2	1.5	13.5	21.0	35.0	46.0	54.5	61.0	66.5	75.0	80.5
	5	2.0	16.0	25.0	40.5	53.5	62.0	68.0	73.0	81.0	86.0
	10	2.5	18.0	27.5	44.0	58.5	68.0	73.5	78.0	84.5	89.5
10	2	4.0	19.0	27.5	42.0	52.0	59.5	65.5	70.5	78.0	83.5
	5	5.0	22.0	31.5	48.0	60.0	67.5	72.5	76.5	83.5	88.5
	10	6.0	24.0	34.5	52.0	65.0	72.5	77.0	81.0	87.0	92.0
20	2	10.5	28.0	38.0	51.0	59.0	66.0	71.5	76.0	83.0	87.5
	5	12.0	32.0	42.0	56.0	66.5	73.0	77.5	81.5	87.0	91.5
	10	13.5	34.5	45.0	61.5	72.0	78.0	82.5	86.0	91.0	94.5
30	2	16.5	36.5	46.0	57.0	64.5	70.5	75.0	79.0	85.5	89.5
	5	18.5	41.0	50.5	62.5	70.5	76.0	80.5	84.0	89.5	93.0
	10	20.5	43.5	53.5	67.0	75.5	81.5	85.5	88.5	93.0	96.0

7-day 2-year low flow in percent of mean flow	Percentage chance of deficiency	REGION C									
		Storage required, in percent of mean annual flow volume									
		0	5	10	20	30	40	50	60	80	100
		Table values are allowable draft, in percent of mean annual flow.									
0	2	0	6.5	13.0	25.0	37.0	49.0	61.0	72.0	83.0	88.5
	5	0	8.0	15.5	29.0	42.5	55.0	67.0	79.0	88.5	92.5
	10	0	10.0	18.0	32.5	46.5	59.5	72.0	83.0	91.5	94.5
5	2	1.5	13.5	21.0	35.0	47.0	58.0	68.0	76.0	85.5	90.0
	5	2.0	16.0	25.0	40.5	53.5	60.5	74.5	82.5	90.0	93.5
	10	2.5	18.0	27.5	44.0	58.5	70.0	79.5	86.0	93.0	95.5
10	2	4.0	19.0	27.5	42.0	54.0	64.5	73.0	79.5	87.0	91.0
	5	5.0	22.0	31.5	48.0	60.5	71.0	79.0	84.5	91.0	94.5
	10	6.0	24.0	34.5	52.0	65.0	75.5	83.0	88.0	94.0	96.5
20	2	10.5	28.0	38.0	51.5	62.0	70.5	77.0	82.5	89.0	92.0
	5	12.0	32.0	42.0	56.0	67.0	75.5	82.5	87.5	92.5	95.0
	10	13.5	34.5	45.0	61.5	73.0	81.0	87.0	91.0	95.0	97.0
30	2	16.5	36.5	46.0	57.5	66.5	73.5	80.0	84.5	89.5	92.5
	5	18.5	41.0	50.5	62.5	71.0	78.0	84.0	88.5	93.0	95.5
	10	20.5	43.5	53.5	67.0	75.5	82.5	88.0	91.5	95.5	97.5



Base from U.S. Geological Survey
State base map, 1:1,000,000, 1958

Figure 19.--Draft-storage regions for the Susquehanna River basin.

FLOODS

Knowledge of the magnitude and the frequency of floods is essential to the water manager or engineer concerned with the planning and the design of structures near a stream and the establishment of flood-plain encroachment lines.

Magnitude and frequency of floods at 37 continuous gaging stations are presented in Appendix A. Flood frequencies were derived by analyzing annual floods (the highest instantaneous peak in each year) and assuming a log-Pearson Type III distribution (Water Resources Council, 1967). The analysis was done by computer. Flood frequencies were calculated only for stations having 20 or more years of record. For other stations, if flood data are available, the highest measured flood discharges through 1966 are listed. Peak discharges for the flood of June 1972 are also included for all gaging stations in operation at that time. The data reflect the operation of any flood-control reservoirs upstream and the effect of any local channel modifications or encroachments that existed during the years of record analyzed.

Methods for estimating floodflow frequency at ungaged sites on streams in New York have been developed in regionalization studies by Robison (1961) and Tice (1968). Magnitude of flood peaks is controlled by basin size and by intensity, duration, and extent of precipitation, modified by channel and land-surface slope, soil type, and previous moisture condition. Although the effect of each factor has not been precisely determined, previous studies have found that their combined effect may be approximated by defining arbitrary regions in such a way that within each region there is a consistent empirical relationship between drainage-basin size and peak streamflow.

The annual peak flow having a recurrence interval of 2.33 years was used as an index for regionalization by Tice (1968), who plotted it against drainage area for each long-term gaging station. His results, as they apply to the Susquehanna River basin, are reproduced in figures 20 and 21. Three regions with similar floodflow properties are indicated (fig. 21A). The areal extent of each region is shown in figure 20. If floodflow information is needed at an ungaged site, the index flood can be estimated from the proper curve in figure 21A after the appropriate region has been determined from figure 20 and the drainage area at the site has been computed. As indicated by the lower limit of drainage area in figure 21A, the index flood for areas of less than 5 square miles (13 square kilometers) cannot be properly evaluated. As of 1970, data in New York were insufficient to regionalize flood hydrology in such small basins. Regional flood-frequency values apply only to unregulated streams. However, they may be useful on regulated streams if applied to areas that lie between the site of interest and a gaging station for which data affected by the regulation are available (Appendix A).

A variety of other reports are available to assist in estimating flood hazards at particular locations. Maximum known discharge and stage at gaging stations and many other sites in the Susquehanna River basin are listed by Dunn (1970). As part of the flood-plain mapping program of the U.S. Geological Survey, analyses of extent, frequency, and profiles of floods near Norwich (Hladio, 1968) and Oneonta (Hladio, 1969) have been prepared.

Areas near Corning and Elmira flooded in June 1972 are shown by Darmer and Wagner (1973 a,b). Flood-prone areas have been delineated on 59 topographic quadrangle maps within the basin, as of 1973 (U.S. Geological Survey 1969-73). Reports by the U.S. Army Corps of Engineers cover several urban localities in the basin, such as the Triple Cities area of Broome County (U.S. Army Corps of Engineers, 1969).

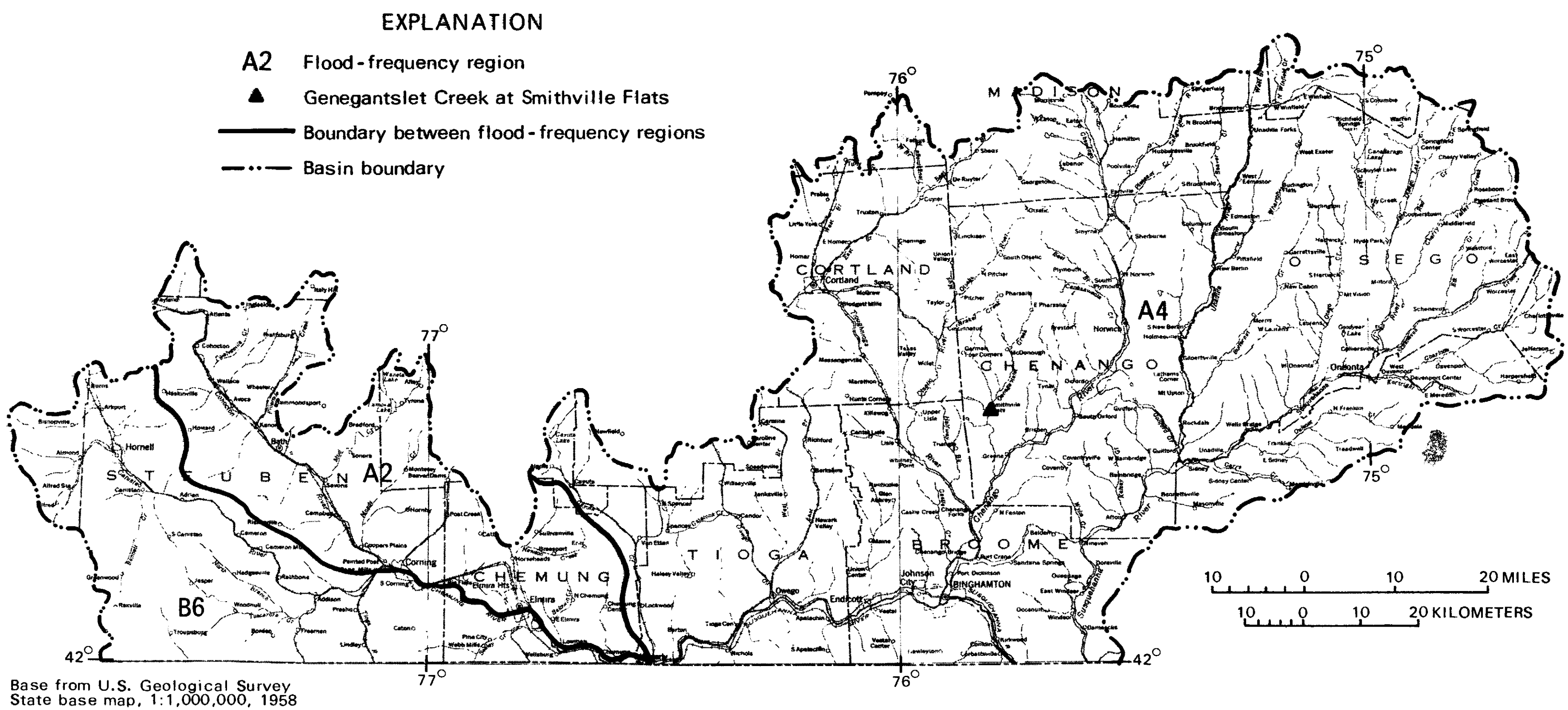


Figure 20.--Flood-frequency regions for the Susquehanna River basin.

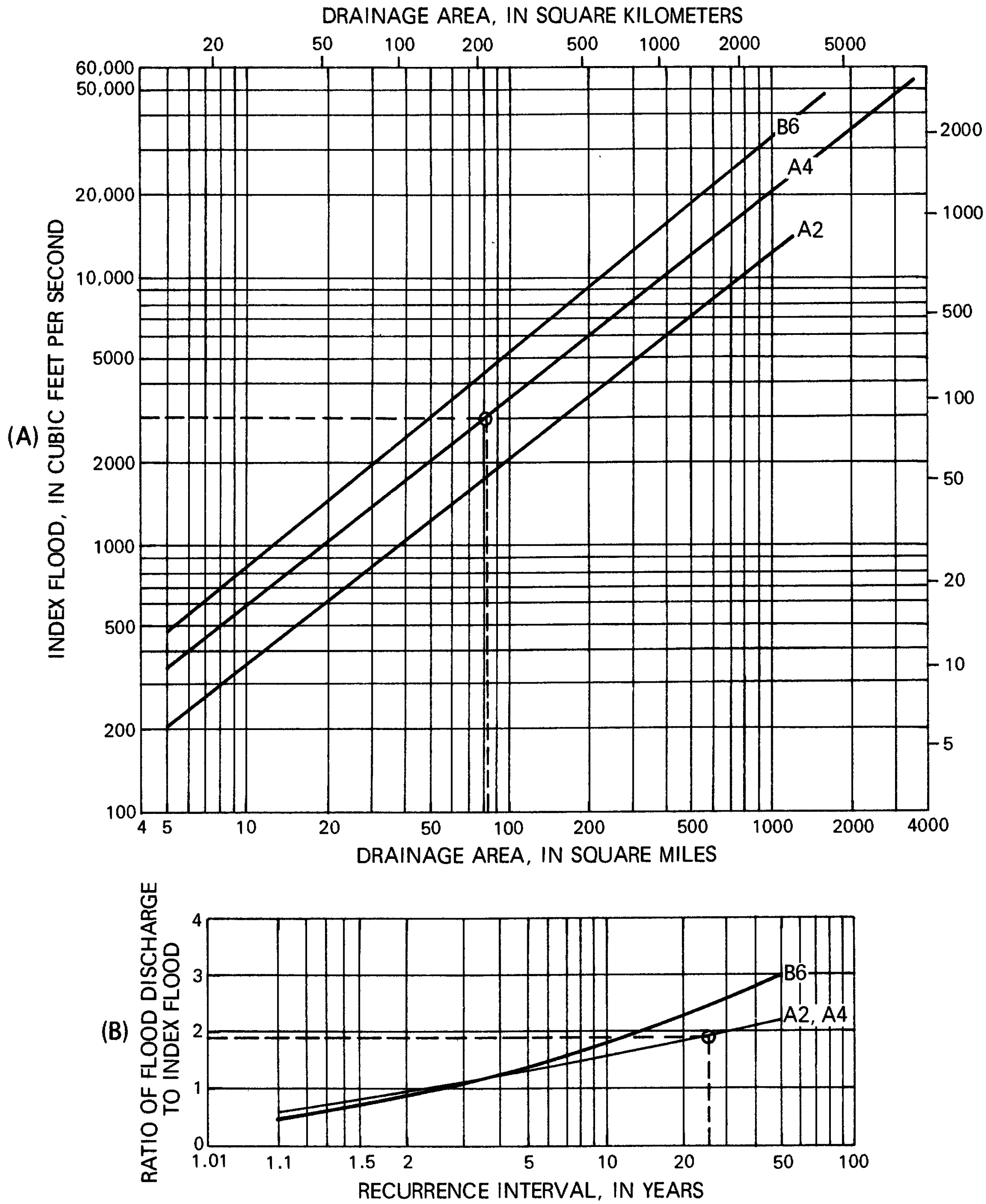


Figure 21.--(A) Variation in index flood, and (B) flood-frequency curves, for flood-frequency regions. *The dashed lines show how to find the 25-year flood on Genegantslet Creek at Smithville Flats, where the drainage area is 83 square miles (220 square kilometers). The flood-frequency region is A4 (from fig. 20), the index flood is 3,000 cfs (from fig. 21A), and the flood with a 25-year recurrence interval is the product of the index flood and 1.9 (from fig. 21B). Hence, the 25-year flood is predicted to be 5,700 cfs (160 m^3/s), which may be compared with 5,129 cfs (145 m^3/s) from analysis of actual streamflow record, Appendix A.*

QUALITY OF STREAMFLOW

The quantity of water available for use from streams in the Susquehanna River basin has been described in previous sections of this report. However, usefullness of the available water depends on its quality, and quality requirements vary according to the intended use. For example, streams used for public water supply in New York are expected to meet standards of chemical and bacterial quality adopted by the Water Resources Commission (New York State Department of Environmental Conservation, 1970). Limits for various constituents set forth in "Public Health Service Drinking Water Standards" (U.S. Public Health Service, 1962) are commonly accepted as standards for delivered municipal water. Requirements for some food and beverage industries (Lohr and Love, 1954) are even more stringent than those for municipal supplies, whereas water used for cooling or steam generation should be low in scale-forming constituents, such as calcium, magnesium, and silica. Water temperature influences fish propagation as well as use of water for industrial cooling. Chemical quality and thermal quality of water in the Susquehanna River basin are described in the remaining sections of this report. Sanitary quality has been evaluated by the New York State Health Department in a series of publications (1954, 1955, 1960) and more recent unpublished studies and is not discussed here.

Factors Controlling Chemical Quality of Streamflow

Study of available chemical analyses and other data disclosed six factors that influence the chemical quality of streamflow in the Susquehanna River basin:

1. *Chemical quality of precipitation.* About one-fourth of the dissolved-chemical load carried out of the Susquehanna River basin by streams is contributed by precipitation on the basin. Samples of precipitation were collected monthly from October 1965 through September 1966 in the form of natural composites at 21 stations on a 20-mile (38-kilometer) grid across the basin. Analyses showed considerable variation in concentrations of constituents from month to month at each site but no systematic differences from one part of the basin to another. Therefore, a statistical summary of basinwide average precipitation quality based on these monthly samples is presented in table 7. The samples were collected in a translucent plastic funnel-and-bottle apparatus at sites at which no local dust sources were apparent. No precautions were taken to minimize bacterial action in the stored samples. Samples visibly contaminated by bird droppings or insects were discarded, but slight contamination may have been overlooked. Hence, the mean values in table 7 may be slightly high. Individual monthly analyses are tabulated in Appendix C. Snow from the storm of December 25-26, 1966, was sampled at 19 sites in southern Broome County and was found to contain more sulfate in Binghamton, Johnson City, and Endicott, 1.6 to 3.0 milligrams per liter, than in the countryside roundabout, 0.5 to 1.2 milligrams per liter, presumably owing to greater fuel consumption in the cities and, hence, a higher sulfur dioxide content in the air there than over the countryside; however, the small difference observed is not

of practical importance. Chemical quality of rainfall also differs from storm to storm (Archer and others, 1968; Thomas and others, 1966) and could explain minor timewise variation in runoff quality.

2. *Volume of runoff.* The original dissolved constituents in precipitation are concentrated when part of the water is returned to the atmosphere by evapotranspiration. The western part of the Susquehanna River basin receives substantially less precipitation and loses slightly more water by evapotranspiration than the eastern part (figs. 3 and 11). Therefore, runoff in the western part of the basin is enriched more than that in the eastern part, which may partly explain why the specific conductance of runoff in the western part of the basin is higher than that in the east (figs. 23 and 26).

3. *Limestone content of the glacial drift.* Calcium and bicarbonate ions are the major dissolved chemical constituents of streamflow throughout the Susquehanna River basin (Pauszek, 1959). To some extent these ions are leached from local bedrock and from fragments of local bedrock that make up the bulk of the glacial deposits. A far richer source of calcium, magnesium, and bicarbonate is the fragments of limestone and other carbonate rocks derived from bedrock outcrops north of the basin and incorporated in some glacial deposits. Several papers (Moss and Ritter, 1962; Denny and Lyford, 1963; Coates, 1963; Merritt and Muller, 1959) have stated that many pebbles and smaller grains of limestone and other carbonate rocks were carried far south of their outcrops by flow of ice and melt water along the wide "through" valleys, which head at the northern divide of the Susquehanna River basin. These grains are now incorporated in the gravel terraces along the "through" valleys and to some extent in till on the valley walls (fig. 22). By contrast, the limestone content of till in the uplands declines rapidly within 5 to 20 miles (8 to 32 kilometers) south of the limestone outcrops. Over most of the basin there is so little limestone in the upland till that weathering has entirely removed the carbonates from the uppermost 6 to 10 feet (1.8 to 3 meters) (Denny and Lyford, 1963, p. 8).

   Variation in limestone content seems to be the most powerful single factor controlling areal variation in chemical quality of streamflow. Not only calcium, magnesium, bicarbonate, and hardness but also dissolved solids and specific conductance correlate strongly with limestone content of sand and gravel along the major valleys. Furthermore, the water carried by tributaries from carbonate-poor uplands normally contains less of these constituents and properties than the water in major rivers that is partly derived from carbonate-rich sand and gravel along major valleys (fig. 23; compare with fig. 22). This contrast is caused not only by the low carbonate content of the unweathered till but also by the fact that most of the water reaching upland streams travels across or through only the uppermost few feet of the till, which is weathered.

4. *Man's activities.* Studies by the New York State Department of Health (1954, 1955, 1960; also 1968 unpublished records) document increased bacterial counts and reduced oxygen levels downstream from many cities and villages. However, these and other data show that municipal-industrial sewage has had only a slight impact on the gross chemical character of the major streams. Downstream from the urban areas of

Broome County, which are the largest in the basin, the chloride content of the Susquehanna River at low flow is about 13 milligrams per liter more than that upstream (table 8); and a tiny increase in hardness could easily be explained by geology.

Tuscarora Creek and the Tioga, lower Canisteo, and Chemung Rivers usually have chloride concentrations higher than those in most other streams and have a correspondingly high ratio of specific conductance to hardness (table 8 and fig. 27), probably because of man's activities. Several gas fields and most of the deep oil or gas test wells in the Susquehanna River basin lie in the catchments of these streams (Kreidler, 1959), and brine produced or leaking from some of these wells (Crain, 1969), may be affecting the quality of streamflow. Other sources may also be involved. Chloride in the Tioga River was ascribed to tannery wastes from Pennsylvania by the New York State Department of Health (1960), and municipal-industrial wastes from Corning and Elmira presumably add chloride to the Chemung River. Chloride concentrations as high as 500 milligrams per liter were present intermittently in the Cohocton River and Owego Creek in 1954-58 and 1953-54 respectively, owing to disposal of water used to wash out cavities for gas storage in deeply buried salt beds near Bath and Harford Mills. More recently, the small amounts of brine produced during operation of the storage facilities are reportedly lagooned and released at high flow.

Upland tributaries are especially sensitive to local sources of pollution because of their generally small flow. Septic-tank effluent in upland areas is commonly discharged to roadside ditches and streams because of the low infiltration capacity of the till and may be responsible for chloride and specific conductance being substantially higher than average in some upland streams draining areas of suburban development (table 8 and fig. 23).

5. *Contact with earth materials.* Concentrations of virtually all chemical constituents of streamflow are greatest during periods of low flow, a relationship traditionally explained by pointing out that during rainless periods the flow of streams is sustained by seepage of ground water that may have spent weeks or even years percolating through earth materials. By contrast, during and shortly after storms, water reaches streams quickly by flowing across the land surface and as rainfall on the channel. Storm runoff has less opportunity to dissolve earth materials and is less subject to concentration of chemical constituents by evapotranspiration of water from the soil. La Sala (1967) showed that the chemical quality of certain streams of western New York on any given date could be estimated fairly accurately by separating the streamflow hydrograph into two components, ground-water discharge (base flow) and overland runoff, and by assuming that a few chemical analyses of low base flow on the main stem and of spring floodflow on small tributaries were representative of the two components. The method was also applied and evaluated by Archer and others (1968). Only approximate results can be expected from the method, at least in the Susquehanna River basin, for several reasons:

(a) Streamflow peaks are energy waves that move downstream faster than the storm runoff that created them. Thus, peak runoff in

downstream reaches of a large stream may consist largely of water that entered the channel before the storm and that is more highly mineralized than the storm runoff (Frimpter, 1973, p. 32).

(b) There is no clear distinction between overland runoff and shallow ground-water discharge in the uplands. Several samples were collected along an abandoned dirt road incised about a foot (0.3 meter) below the original surface of an upland hillside south of the city of Binghamton, where surface runoff occurs during and for several days after some major storms and periods of snowmelt. The hillside upslope was largely meadow, with some brush and woodlot, unused during the period of study. Results are summarized in figure 24 and table 9. Figure 24 shows that specific conductance is not strongly correlated with flow conditions at the site or with flow duration of nearby streams. Four of the samples plotted in figure 24 were collected several days after the last rain or snowmelt and, hence, must represent ground water draining from the till. These four samples do not differ significantly in specific conductance from samples that represent sudden large surges of runoff during or immediately after storms. Both the storm runoff and the shallow ground-water discharge may have followed a similar path, partly through shallow subsurface openings in the till (mole runs, cavities formed by ice or roots, fractures, sandy zones, and loose soil) and partly across the land surface. Samples were also collected from five small springs and five streams in the basin of Pumpelly Creek 15 miles west of Binghamton during periods of moderately high base flow (50-67 percent flow duration). Chemical quality of water from the first two of the five springs (table 10) was similar to median chemical quality of samples from the Binghamton site (table 9), most of which apparently represent overland runoff. Water from the other three springs contained substantially more calcium, magnesium, and bicarbonate, resembling samples from some nearby wells (Randall, 1972).

(c) Chemical quality of storm runoff from the uplands may vary significantly from place to place. During periods of fair-weather snowmelt in early 1966, samples of runoff flowing in grassy swales or tiny rills were collected at 18 sites scattered over the uplands of the Susquehanna River basin. Median chemical quality was similar to that at the Binghamton site (table 9) and is probably a reasonable average for storm runoff from upland hillsides basinwide, except perhaps in the northeast corner of the basin. However, as shown by table 9, the variation from place to place is substantial, much greater than variation with time observed at the Binghamton site.

(d) Change in chemical quality between high and low flow along most major streams in the Susquehanna River basin is caused by a change in source of ground water as well as by a change in percentage of ground water as a component of streamflow. At high flow, about 90 percent of the water carried by the rivers originates as overland runoff or shallow ground-water discharge on upland hillsides, which, as explained under factor 3, are generally poor in limestone. Sand and gravel along the major valleys, much of which is rich in limestone (fig. 22), contributes at least 80 percent of

the low base flow. The result is that the increase in dissolved-solids concentration from high to low flow is greater in most major streams than in small streams that drain only upland areas.

6. *Volume of lakes*. Streamflow entering a lake blends with lake water, so that the highest and lowest concentrations of dissolved constituents that occur from time to time in inflow to the lake are not observed in the outflow. A large lake with a replacement time greater than 1 year will discharge water whose quality is equivalent to that of tributary streams at mean flow (F. J. Pearson, written commun., 1968).

Table 7. - Average chemical quality of precipitation, Susquehanna River basin, New York

(Table values are averages of apparently uncontaminated natural-composite monthly samples of precipitation during the 1966 water year at 21 sites plotted in figure 2. Chemical constituents and hardness in milligrams per liter. Analyses by U.S. Geological Survey, Albany, N.Y.)

Constituent or property	Annual average				Summer (May-September)				Winter (October-April)			
	Mean	Standard deviation	Maximum	Minimum	Mean	Standard deviation	Maximum	Minimum	Mean	Standard deviation	Maximum	Minimum
Calcium	1.1	1.0	7.6	0	1.2	0.8	4.4	.2	1.0	1.1	7.6	0
Magnesium a/	.20	.14	.90	.01	.24	.17	.90	.04	.17	.12	.71	.01
Sulfate	5.7	2.8	27	0	6.5	3.8	27	0	5.1	1.8	12	2.0
Chloride	.6	.5	3.1	0	.6	.6	2.8	0	.6	.42	3.1	.1
Hardness (Ca, Mg as $CaCO_3$)	3.3	2.6	19	0	3.8	2.4	14	.5	3.0	2.7	19	0
Specific conductance (micromhos per cm at 25°C)	40	16	108	12	40	17	108	12	40	15	89	13
pH	b/4.5		7.3	4.0	b/4.6		7.0	4.0	b/4.4		7.3	4.0

a/ Reported to nearest 0.01 mg/l below 1 mg/l.

b/ Median.

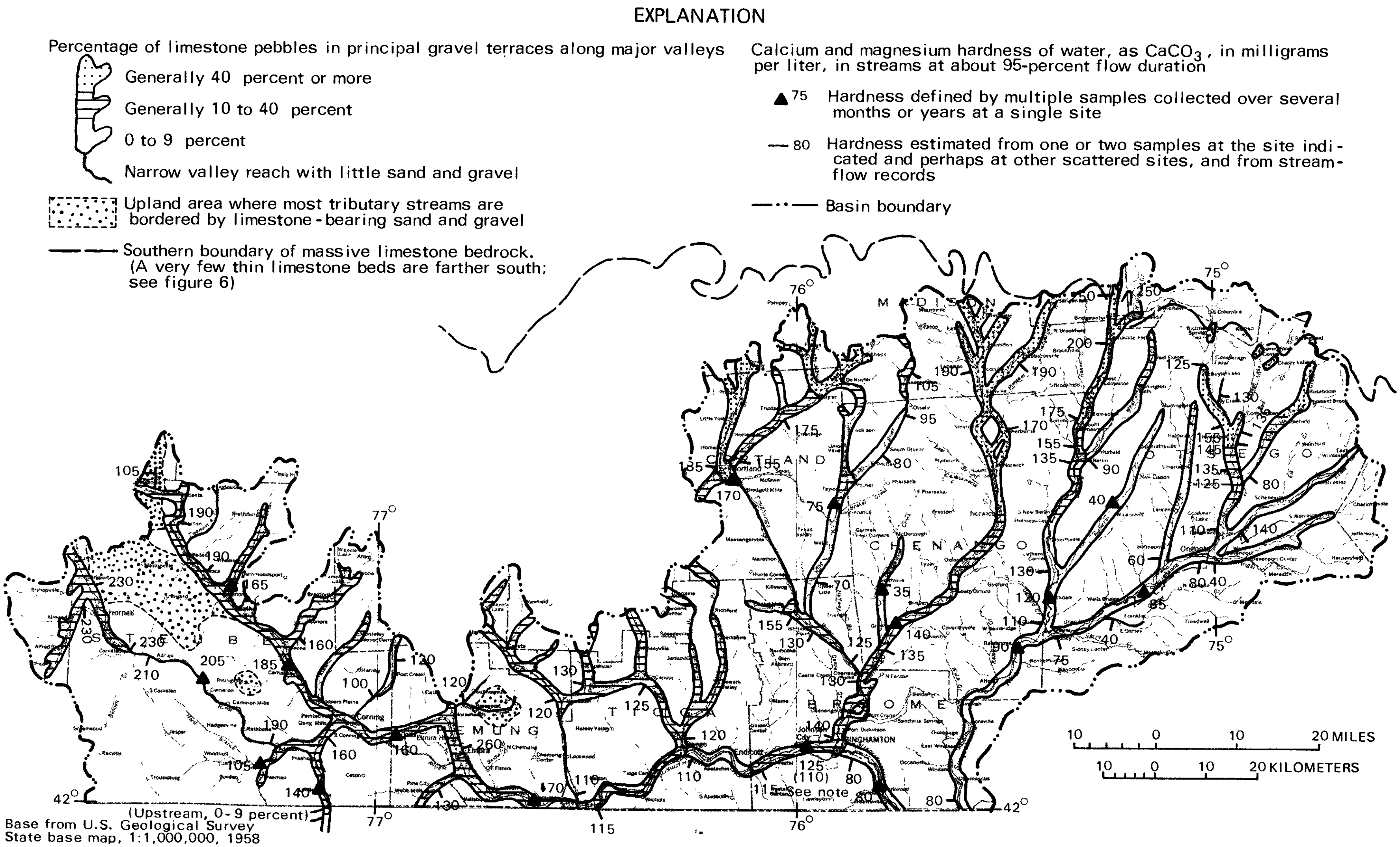


Figure 22.--Limestone content of sand and gravel as related to hardness of water in major streams at low flow. *Limestone pebble distribution adapted from Denny and Lyford (1963), Moss and Ritter (1962), Cadwell (1972), and a few personal observations. (Note: Samples from Johnson City were collected near the north bank of the Susquehanna River and chiefly represent water contributed by the Chenango River. Estimated river-wide average hardness of water is given in parentheses.)*

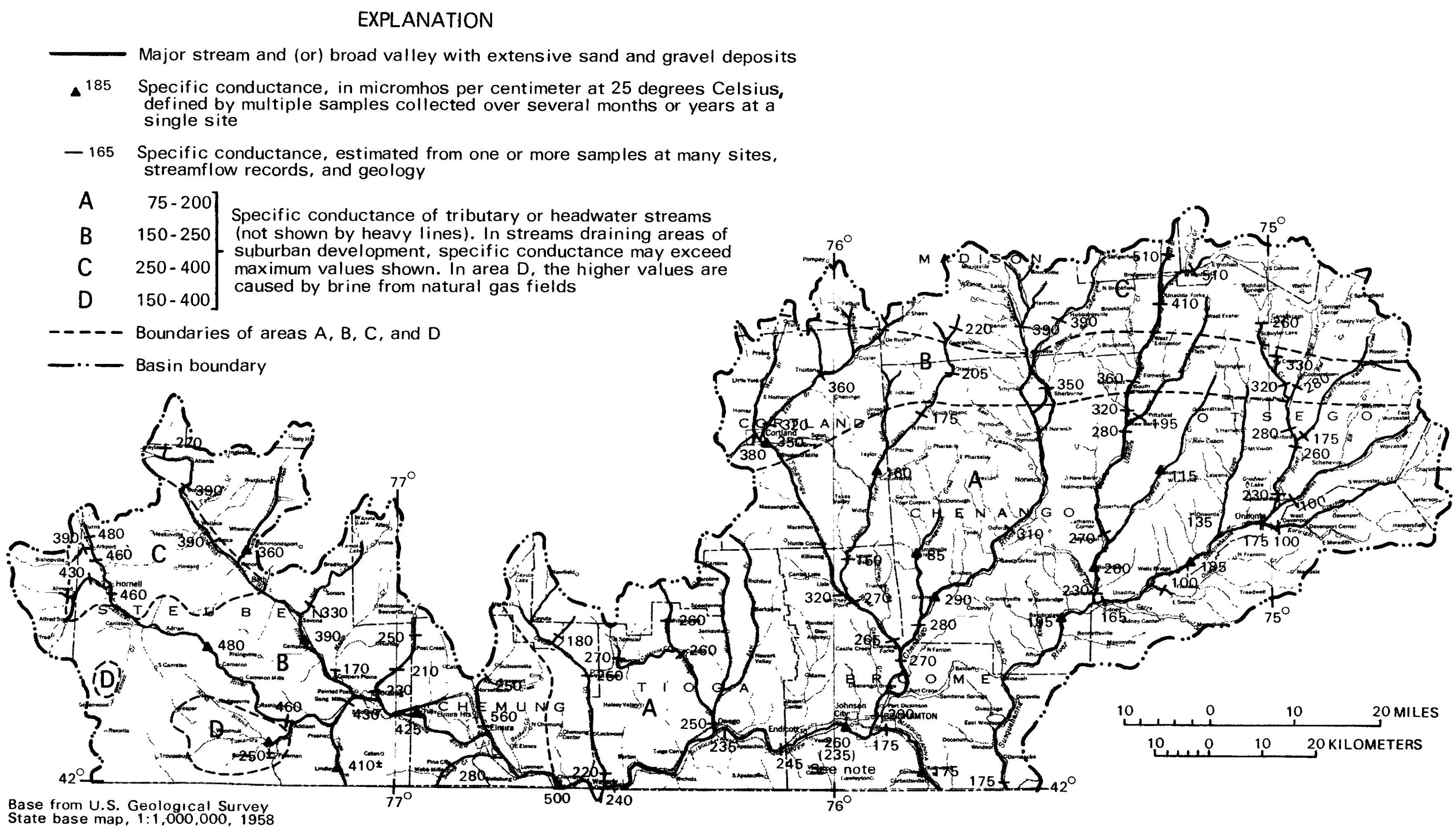


Figure 23.--Specific conductance of water in streams at low flow (95-percent flow duration). *Values shown are exceeded only about 5 percent of the time. (Note: Samples from Johnson City were collected near the north bank of the Susquehanna River and chiefly represent water contributed by the Chenango River. Estimated river-wide average specific conductance of water is given in parentheses.)*

Table 8.--Chloride concentration in streams, Susquehanna River basin, New York

Stream	Typical chloride concentrations (milligrams per liter)		Basis for computation of chloride concentrations
	Median flow (50 percent 1931-60 flow duration)	Low flow (about 95 percent 1931-60 flow duration)	
Susquehanna and Chenango Rivers at and upstream from Binghamton	3 to 5	4 to 8	Average chloride concentration for the indicated flow was selected from a regression line of chloride concentrations plotted against streamflow for each of nine stations sampled regularly. The range of these nine average values is shown.
Susquehanna River, downstream from Binghamton	--	19	Concentration shown is an average of two to four samples at each of four sites, 1953.
Chemung, Tioga, lower Canisteo Rivers; Tuscarora Creek	12 to 17	25 to 35	Average chloride concentration for the indicated flow was selected from a regression line of chloride concentrations plotted against streamflow for each of five stations sampled regularly. The range of these five average values is shown. Chloride concentration of the Tioga River was highly variable at low flow; maximum observed concentration was 82 mg/l.
Cohocton and upper Canisteo Rivers	--	10±	Estimated from concentrations of two to four samples at many sites at larger flow, 1953 and 1958.
Fivemile Creek (tributary to Cohocton River at Kanona)	12	17	Average values for indicated flows, based on monthly samples 1967-70.
Upland tributaries in eastern Susquehanna River basin	--	4.2 (0 to 49)	Median (and range) of individual samples at 50 sites, collected chiefly in August 1966.
Upland tributaries in Chemung River basin	--	7.3 (4.3 to 37)	Median (and range) of individual samples at 25 sites, collected chiefly in August 1966.

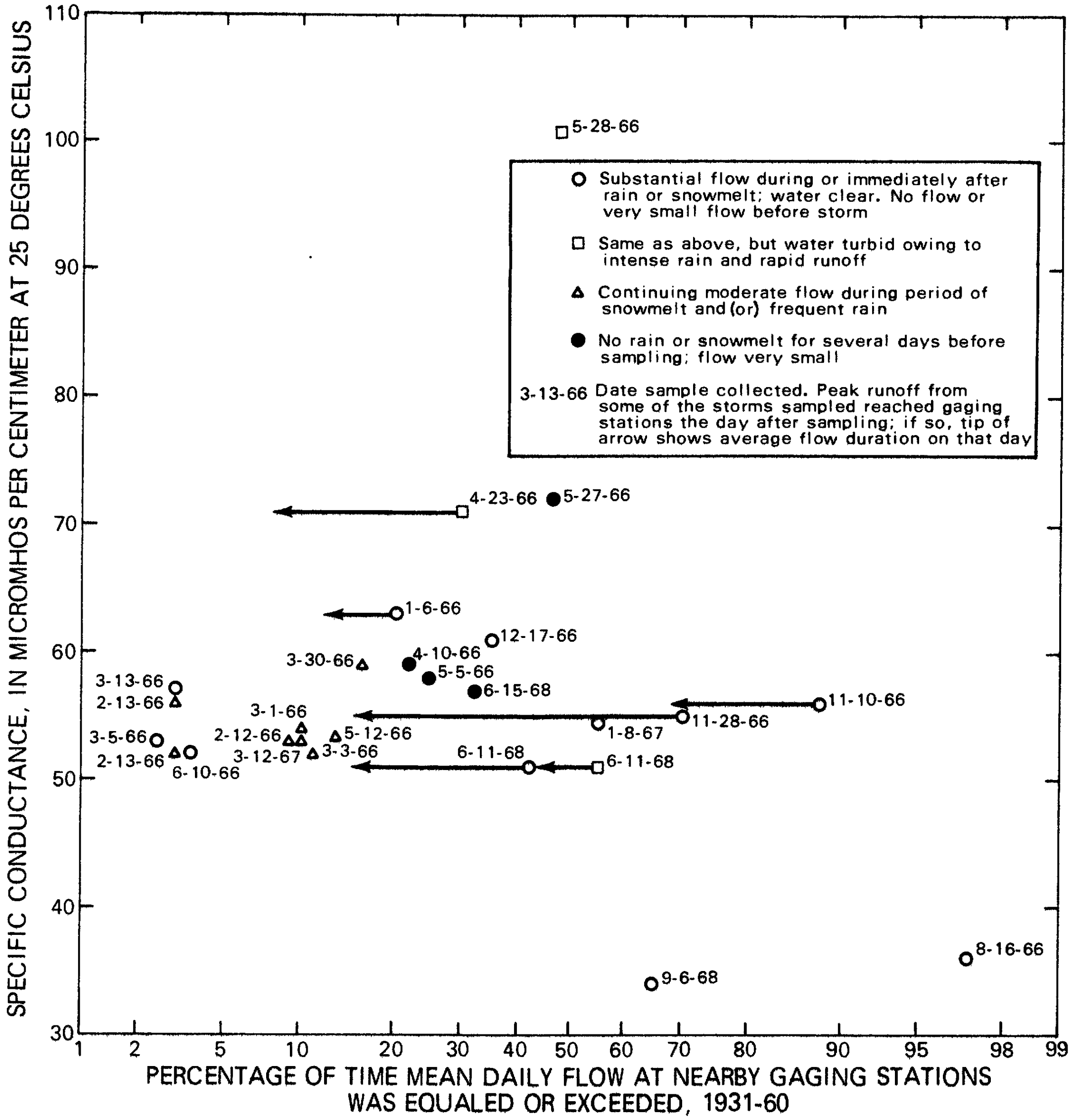


Figure 24.--Specific conductance of apparent overland runoff from a hillside in the town of Binghamton.

Table 9.--Chemical quality of apparent overland runoff and shallow ground-water discharge from upland hillsides, Susquehanna River basin, New York (Chemical constituents and hardness in milligrams per liter. Locations of sampling sites, dates of sample collection, and individual analyses are listed in Appendix D. Analyses by U.S. Geological Survey, Albany, N.Y.)

		Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) + Potassium (K) as Na (calculated) a/	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Hardness (Ca, Mg) (as $CaCO_3$)	Specific conductance (micromhos per cm at 25°C)	pH
A. Multiple samples at site near Binghamton, 1966-68	Median	2.5	5.4	1.3	2.0	5.5	16	1.5	0.3	18	55	6.2
	Maximum	6.1	10	3.0	3.2	20	26	1.9	4.3	36	101	6.9
	Minimum	1.1	2.2	.6	1.1	3	6.5	.0	.0	8	34	5.7
	Number of samples	8	14	14	12	14	15	14	14	14	26	19
B. Single samples at 18 other sites throughout the Susquehanna River basin, spring 1966	Median	3.6	5.3	1.7	1.8	8	15	1.7	.1	20	57	6.5
	Maximum b/	5.4	78 (20)	4.7	5.3	210 (61)	25	5.9	19 (7)	214 (67)	422 (145)	7.4
	Minimum	2.6	2.6	.1	.5	2	8.8	.5	.0	9	30	5.2
	Number of samples	13	18	18	18	18	18	18	18	18	18	18

a/ Some values at the Binghamton site were determined; others were calculated. All values calculated for other sites.

b/ Maximum values for calcium, bicarbonate, nitrate, hardness, and specific conductance are about three times the next highest (shown in parentheses); the maximum values are from a sample collected on a hillside in the northeast corner of the basin and were probably influenced by limestone bedrock and a cattle pasture.

Table 10.--Chemical analyses of water from springs and small streams, Pumpelly Creek basin
(Samples collected during periods of base flow in June 1967. Chemical constituents and hardness in milligrams per liter. Locations of sampling sites, dates of sample collection, and individual analyses are listed in Appendix D. Analyses by U.S. Geological Survey, Albany, N.Y.)

	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) + Potassium (K) as Na	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Hardness (Ca, Mg) (as $CaCO_3$)	Specific conductance (micromhos per cm at 25°C)	pH
Individual springs	8.1	5.2	1.5	2.3	9	15	2.0	0.0	19	57	7.0
	5.8	5.3	1.8	2.2	12	14	1.2	.0	20	58	6.8
	7.7	13	3.4	5.6	32	26	3.7	1.9	46	128	7.1
	a/ 7.3	11	4.4	10	16	22	20	3.9	46	158	6.9
	a/ 8.7	20	8.1	13	20	22	44	13	84	256	6.9
Median of five samples from stream channels	4.6	13	3.4	4.6	42	15	2.7	.1	46	122	7.2

a/ High chloride, nitrate, and sodium may reflect manure or fertilizer from upslope farmland.

Is the Chemical Quality of Streamflow Changing?

Maps and tables in this report were constructed on the assumption that chemical data from different sites are comparable, even though collected in different years from 1942 through 1970 -- in other words, that changes in man's activities have not caused a persistent increase or decrease in the major chemical constituents of streamflow. This assumption seems reasonable, except possibly for the Susquehanna and the Chemung Rivers downstream from major urban centers near Binghamton and Elmira, because population increase has been modest over most of the basin, and a small increase in manufacturing has been accompanied by a decline in farming. In Otsego County, for example, population increased 13 percent between 1940 and 1960, and total manufacturing employment increased 7 percent between 1947 and 1963 (New York State Department of Commerce, 1967-68 and no date). However, there are very little data to verify or disprove the assumption that chemical data from different sites and different years are comparable. The longest record of more or less regularly scheduled analyses in the basin is at Bainbridge on the Susquehanna River. At that site, the average dissolved-solids concentration at any given flow probably did not change significantly between 1942 and 1964 (fig. 25). By contrast, an increase in mean sulfate concentration from 9.2 milligrams per liter for 20 samples collected during 1942-44 to 12.8 milligrams per liter for 20 samples collected during 1953-64 was found to be statistically significant at the 5 percent confidence level by a two-sample t-test (Dixon and Massey, 1957, p. 102 and p. 121) and cannot be explained by differences in discharge. Most sulfate in streamflow in rural areas is derived from precipitation (Fisher and others, 1968; Gambell and Fisher, 1966), so the observed increase could be due to an increase in derivatives of sulfur in the atmosphere.

Estimating Chemical Quality at Any Site

The preceding discussion of chemical quality has explained that average specific conductance, dissolved-solids concentration, concentrations of many principal ions, and hardness of water in any particular stream in the New York part of the Susquehanna River basin at any particular flow are influenced by the average chemical quality of precipitation (which seems uniform basinwide), by the departure of the particular flow from mean flow, and by the following characteristics of the area drained: ratio of annual or seasonal runoff to precipitation, average limestone content of upland till and bedrock, average limestone content of any stratified drift in valleys, volume of lakes, and the effect of man's activities (which may be roughly proportional to population density). Lack of time and of precise values for some of these variables precluded an attempt to develop a prediction equation. However, several useful relationships have been presented. The specific conductance of any stream at low flow may be estimated for figure 23. Variation of specific conductance of major streams with time may be estimated from figure 26, which is based on samples collected daily or monthly at 17 sites. Specific conductance values from figures 23 and 26 or from field measurement may be used with figure 27 to estimate dissolved-solids content and hardness of water. Areal variation in chloride may be estimated from table 8. Chemical analyses of samples collected daily or monthly at 14 gaging

stations (fig. 9) are published in Geological Survey Water-Supply Papers 1350, 1400, 1450, 1520, 1966, 2011, or 2091, and in Water Resources Data for New York, Part 2 (distributed by the Geological Survey in Albany). The hydrologist who desires to construct a chemical quality duration curve for any constituent at a Geological Survey gaging station where samples have not been collected may follow the approximate method of La Sala (1967), using median values in table 9 as representative of runoff from upland hill-sides (La Sala's "overland runoff") and low-flow analyses such as those presented by Pauszek (1959, p. 91-94) or by the U.S. Geological Survey (1968, p. 75-83) as representative of base flow.

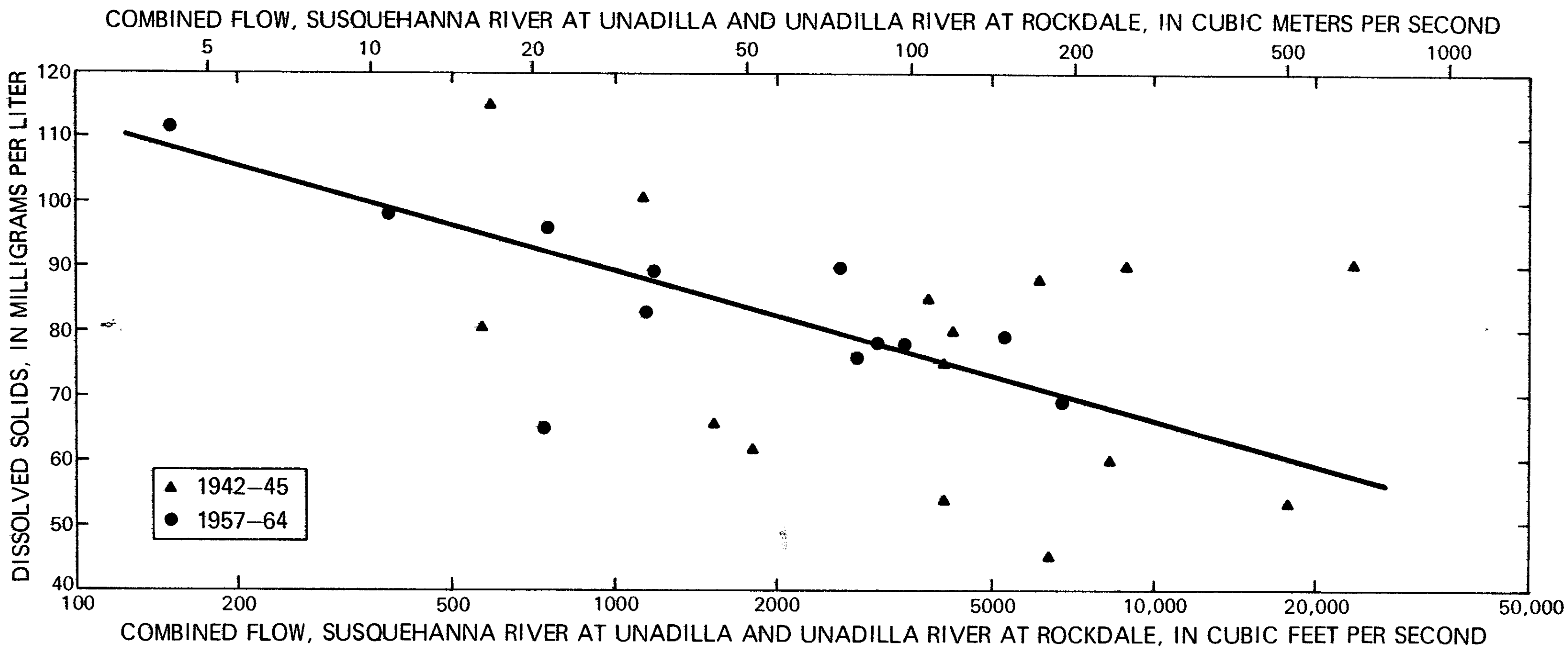


Figure 25.--Relation of dissolved-solids concentration to flow of Susquehanna River at Bainbridge, 1942-64. *The trend line is drawn through the 1957-64 data but is also reasonably consistent with the scattered earlier data. Analyses from records of New York State Electric and Gas Corporation (Jennison Station).*

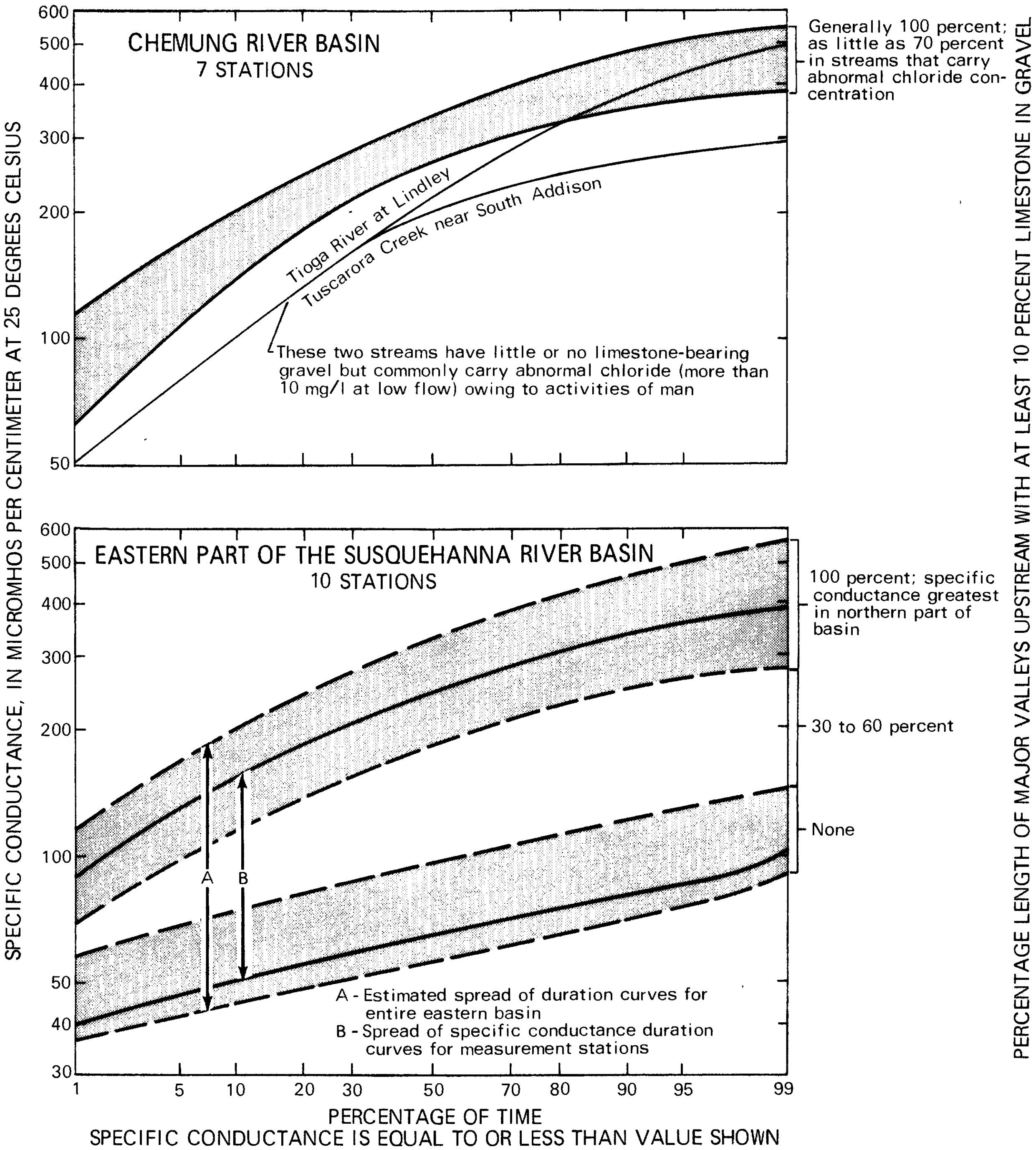


Figure 26.--Variation in specific conductance of streamflow in the Susquehanna River basin with time. *For each station, specific conductance measurements were plotted against instantaneous or daily discharge; the average relation was used to select specific conductance values corresponding to 1931-60 flow-duration values in Appendix A. (Values for Cohocton River at Campbell were based on the variation in hardness, converted to specific conductance using figure 27 because measurements at this station were made in 1956 when the Cohocton River temporarily carried brine waste from excavation of salt caverns for gas storage and specific conductance was abnormally high.)*

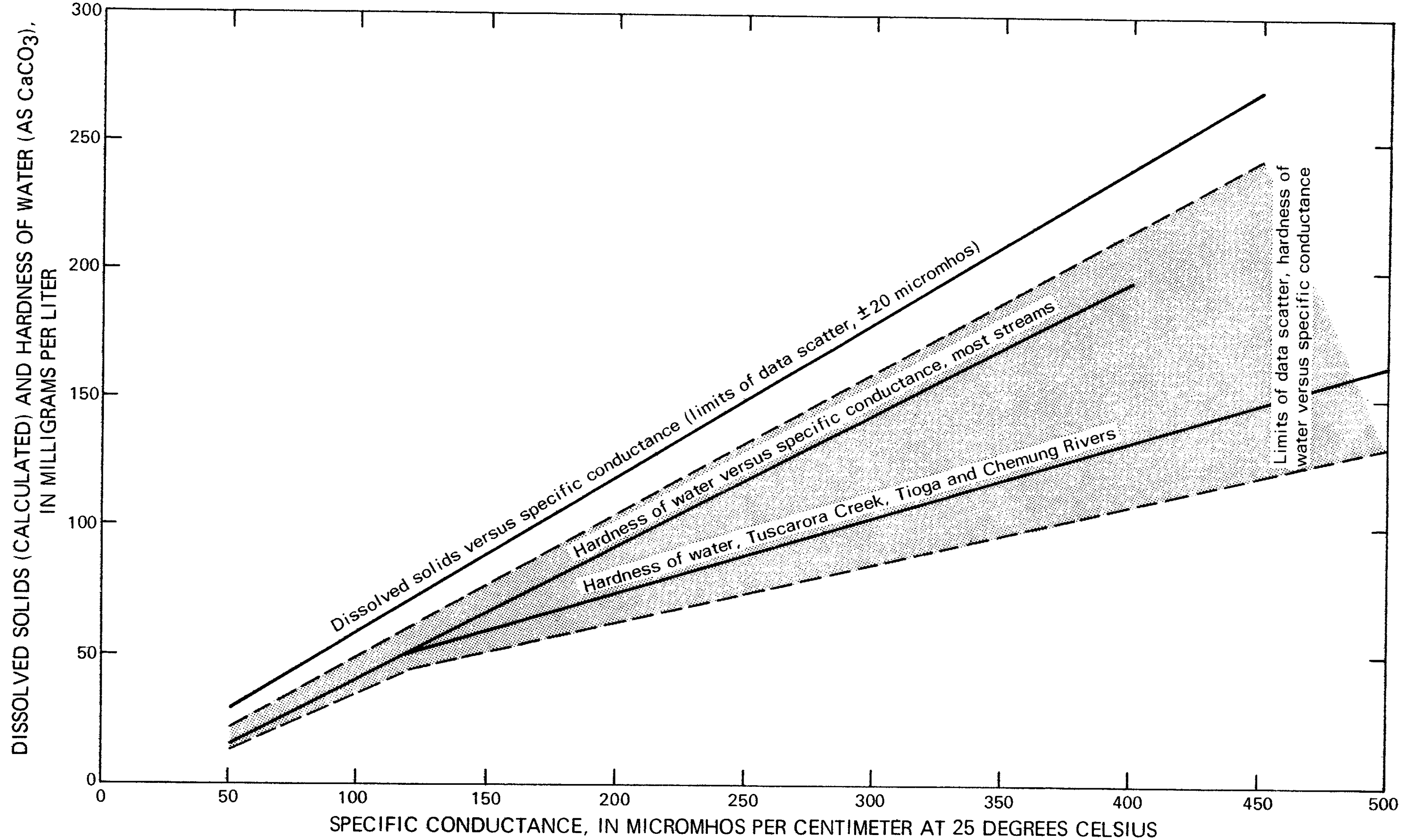


Figure 27.--Relation of dissolved-solids concentration and hardness of water to specific conductance. *Average lines based on more than 100 measurements at 14 stations, from various Geological Survey Water-Supply Papers and New York State Electric and Gas Corporation records.*

Temperature

Temperature of streams in the Susquehanna River basin depends chiefly on air temperature, which is inversely related to altitude and latitude and follows a well-known seasonal cycle. Locally, stream temperature is modified by ground-water inflow, site conditions, and some activities of man (notably reservoir operation and large discharges of heated water from powerplants). Several years of daily temperature records have been collected at various stations (fig. 28). In addition, unpublished monthly temperature measurements over many years at each of the gaging stations in figure 9 are in the files of the Geological Survey.

Temperature variations at two stations with long records, Susquehanna River at Johnson City and Tioughnioga River at Cortland, are illustrated in figures 29 and 30. One reason the annual variation at Cortland is smaller than that at Johnson City may be Cortland's more northerly location and higher altitude (1931-60 normal air temperature computed by the National Weather Service, 46.5°F or 8°C at Cortland and 48.8°F or 9.3°C near Johnson City). However, the major reason is probably an unusually large influx of ground water immediately upstream. Three broad valleys filled with sand and gravel come together at Cortland less than 1 mile upstream from the measurement site. Downstream, the Tioughnioga River valley contains only a narrow thin band of sand and gravel, which probably transmits only a fraction of the underflow arriving from upstream. Monthly mean temperatures for 1 year at four other stations (01-5025, 01-5030, 01-5255, and 01-5310; fig. 25) fall within the range of 30-day means at Johnson City; two other stations (01-5070 and 01-5295; fig. 25) had somewhat lower summer temperatures, but not as low as at Cortland. Study of these and other records suggests that figure 29 may be taken as representative of major streams in the southern part of the basin. If there are unusually broad, thick surficial aquifers immediately upstream (Hollyday, 1969), or extensive high terraces of sand and gravel, or if the stream is small and high in altitude in the northern part of the basin, curves somewhat less extreme than those in figure 29 may be postulated.

Temperature anomalies downstream from reservoirs in the basin have not been studied. However, the effect of major reservoirs on temperatures downstream is known to depend on when the stored water is released and on the level of the reservoir from which the water is drawn (Williams, 1968).

Temperatures of small upland streams (fig. 31) are similar to those of larger streams but tend to fall below most reaches of major rivers (fig. 29) in summer. If the measurements in upland streams had been made at 8 to 10 a.m., as were the measurements at Johnson City and Cortland, the curves in figure 31 would probably have been drawn 1° to 2° Fahrenheit (about 1° Celsius lower). One factor that may help reduce summer temperatures in upland streams is the effect of shade (Brown and Krygier, 1970), because the narrow channels of these streams are easily shaded by riparian vegetation and commonly lie in steep-sided, wooded valleys. Temperatures of upland streams draining heavily forested basins were below the average curve in figure 31 from June to September.

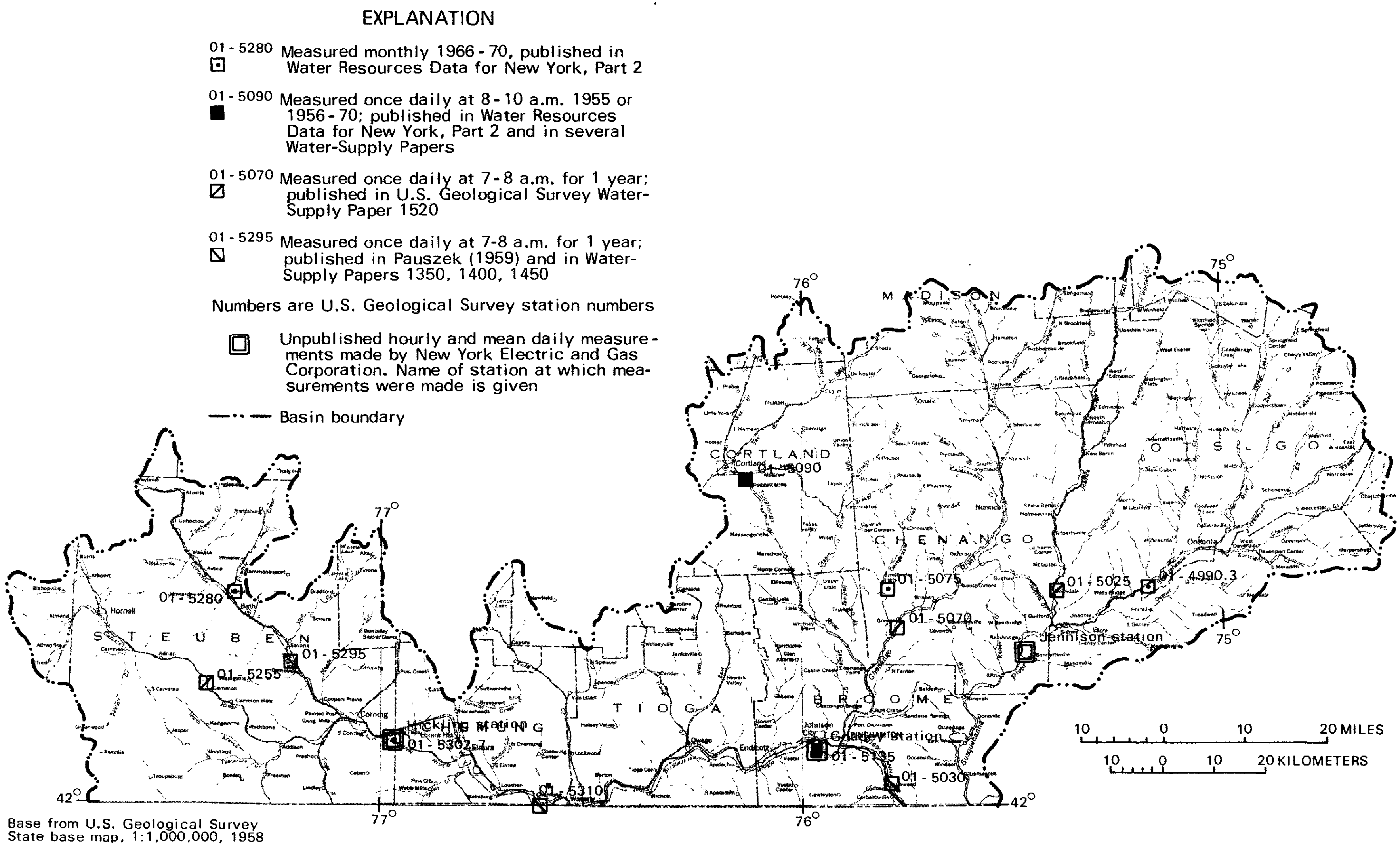


Figure 28.--Sites of scheduled measurements of stream temperature. *Temperature measurements at Goudey Station published by the Geological Survey were referred to station 01-5135 until 1968 when a unique station number, 01-5131.1, was assigned for the temperature measurements.*

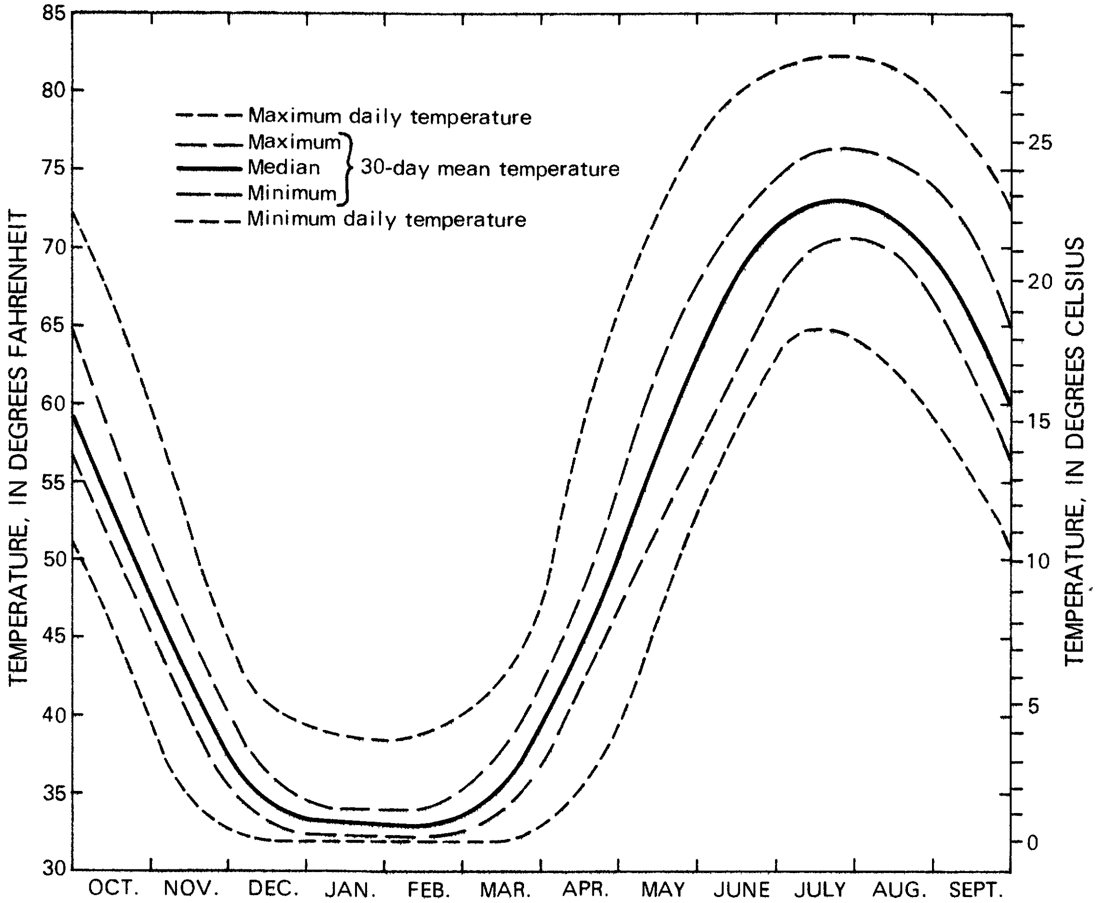


Figure 29.--Variation in temperature of Susquehanna River at Johnson City. *Curves are based on once-daily temperature measurement at about 8 a.m. 1955-67. Measurement site is at Goudey Station of New York State Electric and Gas Corporation, 5 miles (8 kilometers) upstream from Geological Survey station 01-5135 at Vestal. Mean daily temperatures, computed from hourly measurements, average about 1.5°Fahrenheit (0.8°Celsius) higher than 8 a.m. temperatures (except during winter). In winter, heated water is sometimes recirculated through the river intake to prevent icing. This recirculated water causes measured temperature to be slightly above actual river temperature.*

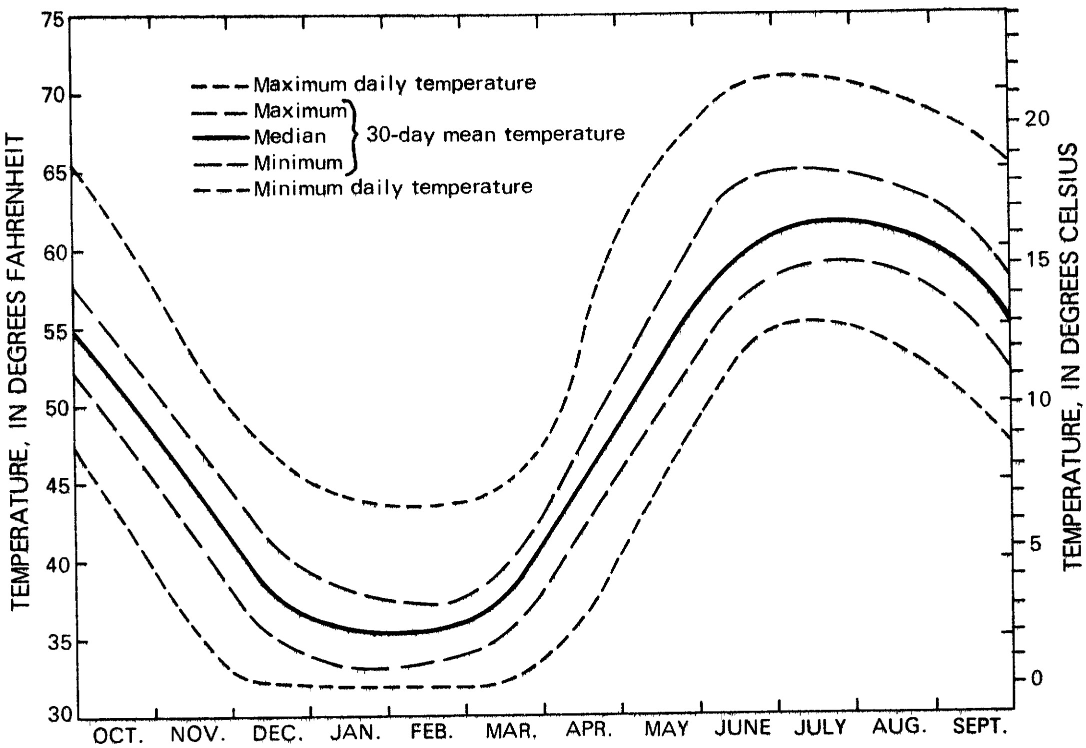


Figure 30.--Variation in temperature of Tioughnioga River at Cortland. *Curves are based on once-daily temperature measurement between 9 and 10 a.m. 1956-67. Maximum daily curve ignores five daily measurements in 1957 that plot well above other data for the same time of year. Measurement site is at municipal sewage-treatment plant, 0.4 mile (0.6 kilometer) downstream from Geological Survey station 01-5090.*

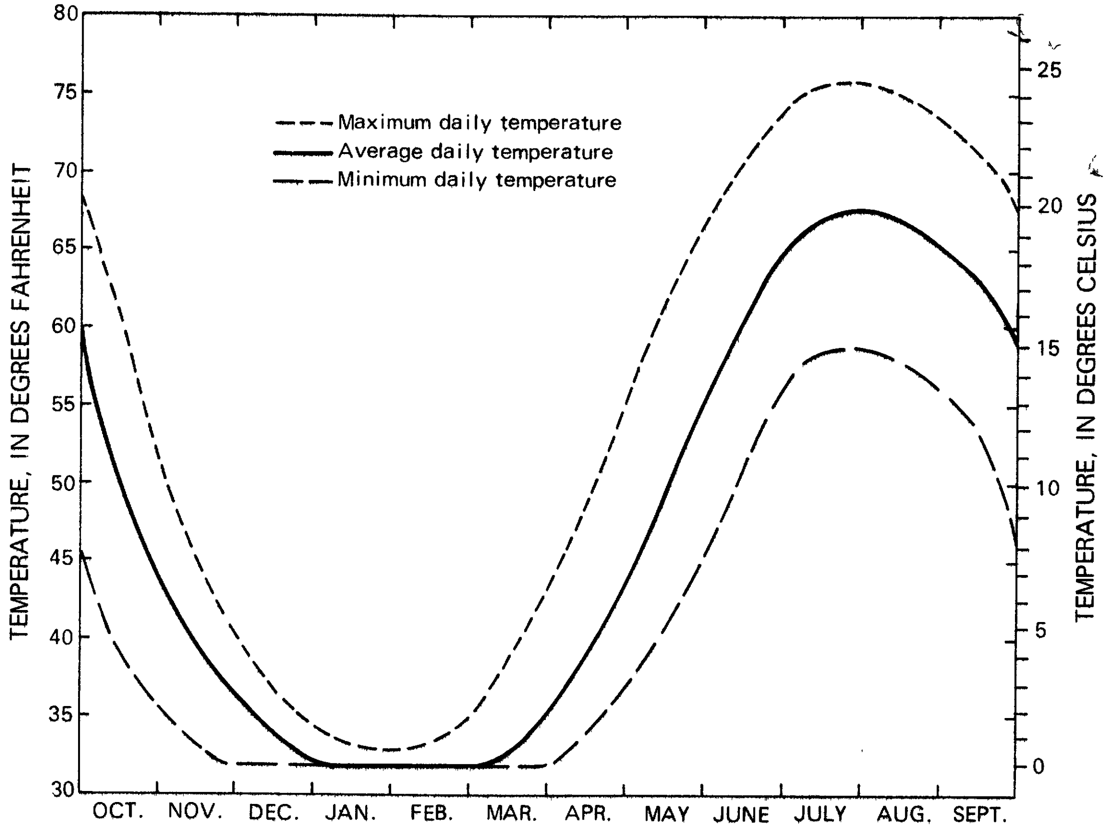


Figure 31.--Variation in temperature of upland streams. *Curves are based on about 215 individual temperature measurements, most taken between 10 a.m. and 3 p.m., at stations 01-5080 and 01-5085 (1961-68), and at stations 01-5074.7, 01-5257.5, and 01-5264.95 (1966-68). (See figure 9 for station locations.) Basins upstream from stations 01-5080, 01-5074.7, and 01-5264.95 were heavily forested.*

SELECTED REFERENCES

Archer, R. J., La Sala, A. M., Jr., and Kammerer, J. C., 1968, Chemical quality of streams in the Erie-Niagara basin, New York: New York State Water Resources Comm., Basin Plan. Rept. ENB-4, 104 p.

Barksdale, H. C., O'Bryan, Deric, and Schneider, W. J., 1966, Effect of drought on water resources in the Northeast: U.S. Geol. Survey Hydrol. Inv. Atlas HA-243.

Beall, R. M., 1968, Storage required to maintain flows, in Harding, W. E. and Gilbert, B. K., 1968, Surface water in the Erie-Niagara basin, New York: New York State Water Resources Comm., Basin Plan. Rept. ENB-2.

Beard, L. R., 1962, Statistical methods in hydrology: U.S. Army Engineer District, Sacramento, California.

Broughton, J. G., Fisher, D. W., Isachsen, Y. W., and Rickard, L. V., 1962, Geologic map of New York: New York State Mus. and Sci. Service Map and Chart Ser. 5.

Brown, G. W., and Krygier, J. T., 1970, Effects of clear-cutting on stream temperature: Water Resources Research v. 6, no. 4, p. 1,133.

Cadwell, D. H., 1972, Late Wisconsinan deglaciation chronology of the Chenango River valley and vicinity, New York: Ph. D. thesis, State Univ. New York at Binghamton, 102 p.

Coates, D. R., ed., 1963, Geology of south-central New York: New York State Geol. Assoc. Guidebook for 35th Ann. Mtg., 116 p.

Crain, L. J. 1969, Ground-water pollution from natural gas and oil production in New York: New York State Water Resources Comm., Rept. Inv. 5, 15 p.

Darmer, K. I., and Wagner, L. A., 1973a, Flood of June 1972 at Elmira, New York: U.S. Geol. Survey Hydrol. Inv. Atlas HA-518.

______1973b, Flood of June 1972 at Corning, New York: U.S. Geol. Survey Hydrol. Inv. Atlas HA-519.

Denny, C. S., and Lyford, W. H., 1963, Surficial geology and soils of the Elmira-Williamsport region, New York-Pennsylvania: U.S. Geol. Survey Prof. Paper 379, 60 p.

Dethier, B. E., 1966, Precipitation in New York State: Cornell Univ. Agr. Expt. Sta. Bull. 1009, 78 p.

Dixon, W. J., and Massey, F. J., Jr., 1957, Introduction to statistical analysis (2d ed): New York City, McGraw-Hill Book Co., Inc., 488 p.

Dunn, Bernard, 1970, Maximum known stages and discharges of New York streams through 1967: New York State Water Resources Comm. Bull. 67, 57 p.

Fisher, D. W., Gambell, A. W., Likens, G. E., and Bormann, F. H., 1968, Atmospheric contributions to water quality of streams in the Hubbard Brook experimental forest, New Hampshire: Water Resources Research v. 4, no. 5, p. 1115.

Flint, J. J., 1967, Hydrogeology and geomorphic properties of small basins between Endicott and Elmira, New York: Thesis, State Univ. New York at Binghamton.

Frimpter, M. H., 1973, Chemical quality of streams, Allegheny River basin and part of the Lake Erie basin, New York: New York State Dept. Environmental Conserv., Basin Plan. Rept. ARB-3, 79 p.

Gambell, A. W., and Fisher, D. W., 1966, Chemical composition of rainfall, eastern North Carolina and southeastern Virginia: U.S. Geol. Survey Water-Supply Paper 1535-K, 41 p.

Gilbert, B. K., and Kammerer, J. C., 1969, Analysis and interpretation of water-resources data of the Genesee River basin: U.S. Geol. Survey open-file report.

______1971, Hydrology of the Genesee River basin: U.S. Geol. Survey Hydrologic Atlas HA-368.

Hardison, C. H., 1966, Storage to augment low flows: Proc. Reservoir Yield Symposium, Water Research Assoc., Marlow, Buckinghamshire, England, Paper 8.

Hely, A. G., and Nordenson, T. J., 1961, Precipitation, water loss, and runoff in the Delaware River basin and New Jersey: U.S. Geol. Survey Hydrologic Investigations Atlas HA-11.

Hladio, Stephen, 1968, Floods on Chenango River and Canasawacta Creek at Norwich, New York: U.S. Geol. Survey Hydrologic Investigations Atlas HA-297.

______1969, Floods on Susquehanna River at Oneonta, New York: U.S. Geol. Survey Hydrologic Investigations Atlas HA-350.

Hollyday, E. F., 1969, An appraisal of the ground-water resources of the Susquehanna River basin in New York State: U.S. Geol. Survey open-file report, 52 p.

Hunt, O. P., 1967, Duration curves and low-flow frequency curves of streamflow in the Susquehanna River basin, New York: New York State Water Resources Comm. Bull. 60, 52 p.

Johnston, Don, and Cross, W. P., 1949, Elements of applied hydrology: New York City, The Ronald Press Co., 276 p.

Kantrowitz, I. H., 1970, Ground-water resources of the eastern Oswego River basin: New York State Water Resources Comm., Basin Plan. Rept. ORB-2, 129 p.

Kreidler, W. L., 1959, Selected deep wells and areas of gas production in eastern and central New York: New York State Mus. and Sci. Service Bull. 373, 243 p.

La Sala, A. M., Jr., 1967, New approaches to water-resources investigations in upstate New York: Ground Water, v. 5, no. 4, p. 6-11.

Lohr, E. W., and Love, S. K., 1954, The industrial utility of public water supplies in the United States, 1952: U.S. Geol. Survey Water-Supply Paper 1299, 639 p.

MacNish, R. D., Randall, A. D., and Ku, H. F. H., 1969, Water availability in urban areas of the Susquehanna River basin: New York State Water Resources Comm., Rept. Inv. 7, 24 p.

Merritt, R. S., and Muller, E. H., 1959, Depth of leaching in relation to carbonate content of till in central New York: Am. Jour. Sci., v. 257, p. 465.

Mordoff, R. A., 1949, The climate of New York State: Cornell Univ. Ext. Bull. 764, New York State Coll. Agriculture, 72 p.

Moss, J. H., and Ritter, D. F., 1962, New evidence regarding the Binghamton substage in the region between the Finger Lakes and the Catskills: Am. Jour. Sci. v. 260, p. 81.

New York State Department of Commerce, 1967-68, Binghamton area business fact book, pt. 1, Business and manufacturing (2d ed.): Albany, New York State Dept. Commerce, 20 p.

______no date, New York State business facts, Binghamton area: Albany, New York State Dept. Commerce, 10 p. (Data for 1920-50).

New York State Department of Environmental Conservation, 1970, Classifications and standards of quality and purity of waters of New York: Pamphlet published by the department, 24 p.

New York State Department of Health, 1954, The Susquehanna River drainage basin: Report published by the department, 325 p.

______1955, Newtown Creek drainage basin: Report published by the department, 43 p.

______1960, Chemung River drainage basin: Report published by the department, 179 p.

Pauszek, F. H., 1959, Chemical quality of surface waters in the Allegheny, Genesee, and Susquehanna River basins, New York; 1953-56: New York State Dept. Commerce Bull. 3.

Randall, A. D., 1972, Records of wells and test borings in the Susquehanna River basin, New York: New York State Dept. Environmental Conserv. Bull. 69, 92 p.

Riggs, H. C., 1966, Hydrologic data for reservoir design: Internat. Assoc. of Sci. Hydrology Pub. 71, v. 2, Symposium of Garda, p. 540-550.

______1968, Some statistical tools in hydrology: U.S. Geol. Survey, Techniques of water-resources inv., Book 4, Chap. A1, 39 p.

Robison, F. L., 1961, Floods in New York, magnitude and frequency: U.S. Geol. Survey Circ. 454, 10 p.

Searcy, J. K., 1959, Flow-duration curves: U.S. Geol. Survey Water-Supply Paper 1542-A, 33 p.

Shampine, W. J., 1973, Chemical quality of surface water in the eastern Oswego River basin: New York State Dept. Environmental Conserv., Basin Plan. Rept. ORB-6, 100 p.

Susquehanna River basin coordinating committee, 1970, Main report, supplements, and appendices: Published by the committee.

Thomas, C. E., Jr., Randall, A. D., and Thomas, M. P., 1966, Hydrologic data in the Quinebaug River basin, Connecticut: Connecticut Water Resources Comm. Bull. 9.

Thomas, M. P., 1966, Effect of glacial geology upon the time distribution of streamflow in eastern and southern Connecticut, in Geological Survey Research, 1966: U.S. Geol. Survey Prof. Paper 550-B, p. B209-B212.

Tice, R. H., 1968, Magnitude and frequency of floods in the United States, Part 1-B, North Atlantic slope basins, New York to York River: U.S. Geol. Survey Water-Supply Paper 1672, 585 p.

U.S. Army Corps of Engineers, 1969, Broome County, New York flood plain information: Baltimore District, U.S. Army Corps of Engineers, mimeo. report.

U.S. Geol. Survey, 1968, Water resources data for New York, 1966, part 2, Water-quality records: U.S. Geol. Survey open-file rept., 168 p.

______1969-73, Maps of flood-prone areas: Washington, D.C., U.S. Geol. Survey. (Single sheets on a topographic base for 7½ minute quadrangles)

U.S. Public Health Service, 1962, Public Health Service drinking-water standards: U.S. Dept. Health, Education, and Welfare, Public Health Service pub. 956, 61 p.

Water Resources Council, Hydrology Committee, 1967, A uniform technique for determining flood flow frequencies: Washington, D.C., Water Resources Council, 15 p.

Weist, W. G., Jr., and Giese, G. L., 1970, Water resources of the central New York region: New York Water Resources Comm. Bull. 64, 58 p.

Williams, O. W., 1968, Reservoir effect on downstream water temperatures in the upper Delaware River basin, *in* Geological Survey Research, 1968: U.S. Geol. Survey Prof. Paper 600-B, p. B195-B199.

Appendix A.--Statistical summary of streamflow

Periods of record: In general, years listed in this Appendix are water years, beginning October 1 and ending September 30. However, years listed in the headings of annual lowest mean flow tables are climatic years, beginning April 1 and ending March 31. Both of these special years are identified according to the calendar year that includes 9 of their 12 months. Statistics for long-term continuous-record stations are based on data collected through September 1967; the years of actual or adjusted record represented by each set of statistics are given. Records of daily flow subsequent to 1967 have been collected at many of these stations, as shown in table 2. Statistics for partial-record stations and for short-term continuous-record stations are estimated by correlation with long-term index stations. The uncertainty in estimating magnitude of flows by correlation is probably greater than the uncertainty in frequency caused by somewhat different periods of record at index stations. Also, for many correlations, two nearby, long-term stations having different lengths of record were used as index stations. Therefore, flow statistics for partial-record stations and short-term continuous-record stations are indicated as applying "through" 1959, 1966, or 1967, which should be interpreted to mean a period of 20 years or longer ending in the year listed.

Regulation or diversion: Any regulation or diversion known to affect each station as of 1967 is noted under remarks.

01-4965.00 Oaks Creek at Index, N.Y.

LOCATION.--Lat 42°39'56", long 74°57'36", Otsego County, on right bank 200 ft upstream from bridge on State Highway 28 at Index, 0.5 mile upstream from mouth, and 3 miles southwest of Cooperstown.

DRAINAGE AREA.--102 sq mi.

RECORDS AVAILABLE.--November 1929 to September 1932, March 1937 to September 1967.

AVERAGE DISCHARGE.--32 years, 163 cfs

MINIMUM DAILY DISCHARGE.--1.4 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1930-32, 1937-67

1.1	2	5	10	25	50
824	1,379	1,905	2,243	2,661	2,965

608 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1931, 1938-59			1931, 1938-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	12	4.7	3.8	9.5	2.9	1.4
7	13	5.3	4.4	11	3.3	1.7
30	17	7.3	5.8	14	4.3	2.2

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-32, 1938-67	990	560	400	260	180	120	90	66	45	27	14	8	3	2.3	1.6
1931-60	1,000	570	415	265	190	140	100	73	51	32	18	12	6.6	5.8	4.9

REMARKS.--Before June 1964, flow regulated by natural storage in Canadarago Lake; by dam at outlet thereafter. Dam reportedly closed each spring to raise lake level about 2 ft for recreational purposes; opened each fall.

01-4967.80 Cherry Valley Creek tributary at Roseboom, N.Y.

LOCATION.--Lat 42°45'31", long 74°46'50", 1,000 ft west of State Highway 166, 1.0 mile north of Roseboom, Otsego County, and 2.5 miles southwest of Cherry Valley.

DRAINAGE AREA.--1.60 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.1	0.07	0.06	0.1	0.06	0.05
7	.15	.08	.07	.1	.07	.06
30	.2	.1	.09	.15	.09	.07

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					3.0	2.0	1.4	0.96	0.60	0.35	0.20	0.13	0.07		
1931-60					3.0	2.0	1.4	.96	.62	.39	.23	.16	.10		

01-4969.20 Shellrock Creek near Middlefield, N.Y.

LOCATION.--Lat 42°43'03", long 74°49'08", 400 ft east of Hubbel Hollow Road, 0.6 mile north of junction of Hubbel Hollow Road and State Highway 166, and 2.3 miles northeast of Middlefield, Otsego County.

DRAINAGE AREA.--5.45 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.1	0.04	0.03	0.09	0.02	0.01
7	.15	.05	.04	.1	.03	.02
30	.25	.08	.05	.15	.05	.03

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967									1.9	0.7	0.25	0.1	0.05		
1931-60									2.0	.85	.3	.15	.08		

01-4970.00 Cherry Valley Creek at Westville, N.Y.

LOCATION.-- Lat 42°38'00", long 74°52'55", on left bank 40 ft downstream from highway bridge at Westville, Otsego County, and 4 miles upstream from mouth.

DRAINAGE AREA.--81.3 sq mi.

RECORDS AVAILABLE.--February 1930 to June 1931, July 1938 to June 1941.

PEAK DISCHARGES.--4,470 cfs on September 22, 1938

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	6	2.5				
7	7	3				
30	10	4				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							60	43	30	20	11	6.7	3.6		

REMARKS.--Because of the short period of record, duration and frequency curves were developed on basis of correlation studies using monthly mean discharges during open-water periods.

01-4972.00 Cherry Valley Creek at Milford, N.Y.

LOCATION.--Lat 42°35'34", long 74°55'42", at bridge off State Highway 166, 0.6 mile eest of Milford, Otsego County.

DRAINAGE AREA.--90.4 sq mi.

RECORDS AVAILABLE.--14 discharge measurements (1956-62, 1964).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	6.5	3				
7	7	3.5				
30	9	5				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							47	32	22	14	9.5	7.0	4.5		

01-4975.00 Susquehanna River at Colliersville, N.Y.

LOCATION.--Lat 42°29'59", long 74°58'51", on right bank 0.25 mile downstream from powerplant of New York State Electric and Gas Corp., and 0.5 mile north of Colliersville, Otsego County.

DRAINAGE AREA.--349 sq mi.

RECORDS AVAILABLE.--May 1907 to December 1908, July 1924 to September 1967.

AVERAGE DISCHARGE.-- 43 years, 552 cfs

MINIMUM DAILY DISCHARGE.-- 1.6 cfs, *5.3 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1925-67

1.1	2	5	10	25	50
2,770	4,383	5,824	6,722	7,801	8,570

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1925-59			1925-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	25	10(13)	2.3(10)	23	7.7(12)	4.8(9)
7	46	18	3.8(14)	48	13 (17)	6.7(11)
30	71	32	23	66	27	19

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1925-67	3,200	1,850	1,300	850	600	420	305	225	168	110	54	30	21	17	7.2
1931-60	3,400	1,900	1,400	900	620	440	320	240	170	120	71	36	22	20	15

REMARKS.--Flow regulated by natural storage in Otsego Lake and Canadarago Lake. Large diurnal fluctuations caused by powerplant above station. Subsequent to June 1964, additional regulation by dam at outlet of Canadarago Lake.

Records for May 1907 to December 1908 not used in analysis of duration or frequency data.

Unusual regulation September 4-10, 1946; asterisk (*) indicates 2d lowest mean discharge.

Annual 1-day and 7-day low flows for 10- and 30-year recurrence intervals appear to be influenced by unusual regulation; probable values in the absence of such regulation are shown in parentheses.

01-4975.30 Oak Creek near East Worcester, N.Y.

LOCATION.--Lat 42°38'33", long 74°41'04", at bridge 0.8 mile northwest of Calcutta and 1.5 miles northwest of East Worcester, Otsego County.

DRAINAGE AREA.--5.55 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1967-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.15	0.05	0.03	0.1	0.03	0.02
7	.2	.06	.03	.15	.04	.02
30	.3	.09	.04	.2	.06	.04

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967								2.1	1.2	0.55	0.2	0.1	0.05		
1931-60								2.5	1.4	.7	.3	.2	.08		

01-4978.00 Schenevus Creek at Schenevus, N.Y.

LOCATION.--Lat 42°32'45", long 74°50'00", at bridge on Tannery Street, Schenevus, Otsego County.

DRAINAGE AREA.--57.8 sq mi.

RECORDS AVAILABLE.--22 discharge measurements (1949-50, 1956-62, 1964-66).

PEAK DISCHARGES.--1,700 cfs on March 27, 1963
2,200 cfs on March 5, 1964
200 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	5.2	2.8				
7	5.8	3.1				
30	7.6	4.0				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							51	35	22	13	8.0	5.8	3.8		

01-4979.02 Middle Brook at North Harpersfield, N.Y.

LOCATION.--Lat 42°28'12", long 74°41'06", at bridge on North Harpersfield Road, 0.4 mile southeast of North Harpersfield, Delaware County.

DRAINAGE AREA.--12.0 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1	0.5	0.4	1.0	0.5	0.4
7	1.1	.6	.45	1.0	.6	.45
30	1.5	.8	.6	1.4	.8	.6

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					17	12	9.0	5.7	4.2	1.9	1.4	0.82	0.67		
1931-60					17	13	9.2	6.5	4.5	2.8	1.7	1.2	.7		

01-4979.10 Center Brook at West Harpersfield, N.Y.

LOCATION.--Lat 42°26'02", long 74°43'25", at bridge on Kortright Center Road south of State Highway 23 at West Harpersfield, Delaware County.

DRAINAGE AREA.--12.9 sq mi.

RECORDS AVAILABLE.--5 discharge measurements (1967-68)

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.6	0.3	0.2	0.6	0.3	0.2
7	.7	.35	.25	.65	.35	.25
30	1.0	.5	.35	.9	.45	.35

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967							7.5	4.9	3.2	2.0	1.1	0.7	0.4		
1931-60							7.5	5.2	3.3	2.1	1.1	.75	.45		

01-4979.85 Kortright Creek at East Meredith, N.Y.

LOCATION.--Lat 42°25'25", long 74°53'25", at bridge on Davenport Center Road at East Meredith, Delaware County.

DRAINAGE AREA.--25.6 sq mi.

RECORDS AVAILABLE.--12 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.1	0.55	0.4	1.1	0.55	0.4
7	1.3	.6	.45	1.2	.6	.4
30	1.9	.9	.6	1.7	.8	.6

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967	365	160	95	55	35	23	16	10	6.4	3.8	2	1.3	0.7		
1931-60	300	160	98	55	35	24	16	11	6.8	4	2.1	1.4	.75		

01-4985.00 Charlotte Creek at West Davenport, N.Y.

LOCATION.--Lat 42°26'42", long 74°57'50", Delaware County, on right bank at downstream side of bridge on County Highway 11 at West Davenport, 700 ft upstream from small tributary, and 1.7 miles downstream from Pumpkin Hollow.

DRAINAGE AREA.--167 sq mi.

RECORDS AVAILABLE.--June 1938 to September 1967.

AVERAGE DISCHARGE.--29 years, 245 cfs

MINIMUM DAILY DISCHARGE.--4.5 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1938-67

1.1	2	5	10	25	50
2,170	4,150	5,900	7,050	8,400	9,700

1,820 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1939-59			1939-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	13	7.2	5.4	13	7.2	5.4
7	15	8.0	6.0	14	8.0	5.8
30	21	11.0	7.7	19	10.2	7.7

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1939-67	1,800	840	580	370	255	175	128	88	60	38	22	15	9.0	8.0	6.2
1931-60	1,900	890	590	370	255	185	130	93	62	40	23	16	9.5	8.0	6.2

REMARKS.--Prior to October 1956, published as "at Davenport Center". Drainage area of 164.5 sq mi used in regionalization.

01-4990.00 Otego Creek near Oneonta, N.Y.

LOCATION.--Lat 42°27'03", long 75°06'53", on right bank 1.5 miles south of West Oneonta, 1.7 miles upstream from mouth, and 2.7 miles west of Oneonta, Otsego County.

DRAINAGE AREA.--108 sq mi.

RECORDS AVAILABLE.--August 1940 to September 1967.

AVERAGE DISCHARGE.-- 27 years, 165 cfs

MINIMUM DAILY DISCHARGE.-- 3.6 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1941-67

1.1	2	5	10	25	50
1,482	2,639	3,782	4,537	5,485	6,185

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1941-59			1941-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	12	6.8	5.6	11	5.9	4.8
7	13	7.6	6.4	12	6.8	5.8
30	16	9.5	8.4	15	8.4	7.1

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1941-67	1,200	585	400	280	170	120	88	63	44	27	17	12	7.4	6.8	5.8
1931-60	1,200	590	390	240	165	120	89	64	45	30	19	14	9.7	8.6	7.0

01-4990.24 West Branch Otsdawa Creek near Otego, N.Y.

LOCATION.--Lat 42°25'05", long 75°11'22", at bridge on county road 0.3 mile west of State Highway 417, 0.4 mile upstream from mouth, and 1.5 miles north of Otego, Otsego County.

DRAINAGE AREA.--6.78 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1966-67).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.05	0.01	0.01	0.04	0.01	0.01
7	.07	.01	.01	.06	.01	.01
30	.13	.03	.02	.10	.02	.01

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967							6	4	2.5	0.6	0.15	0.06	0.01		
1931-60							6	4	2.6	.9	.2	.09	.03		

01-4990.50 Flax Island Creek near Otego, N.Y.

LOCATION.--Lat 42°24'00", long 75°12'15", on left bank 250 ft downstream from private bridge, 1.5 miles upstream from mouth, and 1.6 miles west of Otego, Otsego County.

DRAINAGE AREA.--4.22 sq mi.

RECORDS AVAILABLE.--July 1966 to September 1968.

PEAK DISCHARGES.--590 cfs on May 11, 1967
612 cfs on June 12, 1968

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.05	0.01	0.01	0.04	0.01	0.00
7	.06	.01	.01	.05	.01	.01
30	.1	.02	.02	.09	.02	.01

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967	60	28	18	12	6.6	4.6	3.3	2.2	1.5	0.6	0.1	0.05	0.01		
1931-60	60	28	17	10	6.8	4.6	3.3	2.2	1.5	.8	.2	.07	.02		

01-4991.95 Brier Creek near Otego, N.Y.

LOCATION.--Lat 42°23'38", long 75°13'20", along Brier Creek Road, 1.3 miles north of State Highway 7, and 2.4 miles west of Otego, Otsego County.

DRAINAGE AREA.--6.96 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.15	0.04	0.04	0.1	0.04	0.02
7	.15	.06	.04	.15	.05	.03
30	.25	.08	.07	.2	.07	.05

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967							7	4	2	1	0.3	0.15	0.06		
1931-60							7	4	2	1.3	.4	.2	.1		

01-4993.00 West Branch Handsome Brook near Franklin, N.Y.

LOCATION.--Lat 42°18'06", long 75°08'06", at bridge on County Highway 21, 0.1 mile south of Bennett Hollow Road, 2.0 miles upstream from confluence with East Branch, and 2.7 miles southeast of village of Franklin, Delaware County.

DRAINAGE AREA.--8.27 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1964, 1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.15	0.06	0.04	0.15	0.06	0.04
7	.2	.07	.05	.15	.07	.05
30	.3	.1	.07	.25	.1	..07

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967							4.1	2.4	1.4	0.7	0.3	0.1	0.09		
1931-60							4.2	2.6	1.4	.7	.3	.2	.1		

01-4994.70 East Branch Handsome Brook at Franklin, N.Y.

LOCATION.--Lat 42°20'27", long 75°09'09", on left bank at downstream side of bridge, 0.7 mile east of Franklin, Delaware County, and 1.5 miles upstream from mouth.

DRAINAGE AREA.--9.12 sq mi.

RECORDS AVAILABLE.--September 1966 to September 1968.

PEAK DISCHARGES.--269 cfs on March 29, 1967
320 cfs on May 30, 1968

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.5	0.25	0.15	0.5	0.25	0.15
7	.6	.3	.2	.55	.3	.2
30	.9	.4	.3	.8	.35	.3

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967		75	47	26	16	11	7.5	5.1	3.1	1.8	1.0	0.6	0.3		
1931-60		78	48	27	17	12	7.8	5.2	3.2	1.9	1.4	1.0	.45		

01-5000.00 Ouleout Creek at East Sidney, N.Y.

LOCATION.--Lat 42°20'00", long 75°14'07", Delaware County, on right bank 0.2 mile downstream from bridge on County Highway 44, 0.4 mile downstream from East Sidney Dam, at East Sidney, and 4.0 miles upstream from mouth.

DRAINAGE AREA.--103 sq mi.

RECORDS AVAILABLE.--August 1940 to September 1967.

AVERAGE DISCHARGE.--27 years, 163 cfs

MINIMUM DAILY DISCHARGE.-- 1.2 cfs, *1.9 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1950-67

1.1	2	5	10	25	50
1,320	1,840	2,480	2,980	3,720	4,340

16,700 cfs on July 8, 1935
1,170 cfs on June 30, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1941-59			1941-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	7.6	3.1	2.2	6.8	2.6	1.7
7	9.3	4.5	3.7	8.7	3.5	2.5
30	13	7.0	6.0	12	4.7	2.8

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1941-67	1,300	580	380	220	150	110	80	57	40	24	13	7.8	3.9	3.1	2.0
1931-60 a/	1,500	630	410	250	170	120	91	67	47	30	17	11	5.4	4.4	3.1

REMARKS.--Since November 1949, high flows regulated by East Sidney Reservoir.
Unusual regulation in August 1949 caused by upstream construction work; asterisk (*) indicates second lowest daily discharge, not affected by regulation.
a/ Based on pattern of regulation 1950-60 water years.

01-5005.00 Susquehanna River at Unadilla, N.Y.

LOCATION.--Lat 42°19'17", long 75°19'01", Otsego County, on right bank 25 ft downstream from bridge on Bridge Street at Unadilla, 1.0 mile upstream from Carrs Creek, and 1.6 miles downstream from Ouleout Creek.

DRAINAGE AREA.--982 sq mi.

RECORDS AVAILABLE.--June 1938 to September 1967.

AVERAGE DISCHARGE.--29 years, 1,520 cfs

MINIMUM DAILY DISCHARGE.--45 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1938-67

1.1	2	5	10	25	50
8,714	14,242	17,998	19,838	21,635	22,684

6,140 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1939-59			1939-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	110	66	56	108	64	52
7	135	84	76	132	75	58
30	190	105	91	168	93	72

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1939-67	9,600	5,200	3,600	2,300	1,600	1,160	840	600	420	280	175	127	75	65	52
1931-60	9,800	5,300	3,700	2,400	1,700	1,200	870	620	450	300	200	160	98	86	72

REMARKS.--Some diurnal fluctuation caused by powerplants above station. Slight regulation by upstream lakes and reservoirs.

01-5008.00 Carrs Creek at Unadilla, N.Y.

LOCATION.--Lat 42°18'54", long 75°20'03", at bridge on Unadilla-Sidney Road, 0.15 mile upstream from mouth, and 1 mile southwest of Unadilla, Delaware County.

DRAINAGE AREA.--29.6 sq mi.

RECORDS AVAILABLE.--21 discharge measurements (1954-55, 1957-62, 1964-67).

PEAK DISCHARGES.--7,730 cfs on June 10, 1954
4,690 cfs on July 29, 1961

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	trace	0.0				
7	0.1	.0				
30	.8	.0				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							24	17	11	5.8	1.4	0.2	0.0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5009.80 Beaver Creek near South Edmeston, N.Y.

LOCATION.--Lat 42°43'36", long 75°18'10", at bridge on State Highway 8, about 1 mile upstream from mouth, 1.4 miles north of Columbus Quarter, and 3 miles north of South Edmeston, Chenango County.

DRAINAGE AREA.--32.7 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.7	0.2				
7	1.0	.4				
30	1.8	.6				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											2	1	0.4		

01-5009.83 Center Brook near New Berlin, N.Y.

LOCATION.--Lat 42°39'40", long 75°21'30", at bridge on dirt road off State Highway 80, 1.8 miles northwest of junction of State Highways 80 and 8, and 2.9 miles northwest of New Berlin, Chenango County.

DRAINAGE AREA.--10.9 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.12	0.05	0.04	0.12	0.05	0.03
7	.2	.07	.06	.2	.06	.04
30	.4	.14	.1	.3	.1	.07

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967				29	14	10	6	3.8	2	0.9	0.35	0.2	0.08		
1931-60				31	15	11	6.5	4	2.2	1.0	.4	.25	.1		

01-5010.00 Unadilla River near New Berlin, N.Y.

LOCATION.--Lat 42°38'37", long 75°19'24", on right bank 150 ft upstream from site of old highway bridge, 0.2 mile downstream from Center Brook, and 1.4 miles north of New Berlin, Chenango County.

DRAINAGE AREA.--199 sq mi.

RECORDS AVAILABLE.--July 1924 to September 1967.

AVERAGE DISCHARGE.--43 years, 317 cfs.

MINIMUM DAILY DISCHARGE.--8.0 cfs.

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1925-67

1.1	2	5	10	25	50
2,363	3,810	5,014	5,720	6,525	7,072

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1925-59			1925-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	21	11.5	8.9	21	11.8	8.9
7	25	15	12	24	14	12
30	35	19	15	33	18	14

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1925-67	2,200	1,100	760	460	320	230	170	124	84	56	33	24	16	14	12
1931-60	2,400	1,100	760	470	330	245	180	130	90	59	35	26	17	15	12

01-5011.90 Wharton Creek at Pittsfield, N.Y.

LOCATION.--Lat 42°38'31", long 75°17'16", at bridge on town road, 0.3 mile north of State Highway 80 and Pittsfield, Otsego County.

DRAINAGE AREA.--84.4 sq mi.

RECORDS AVAILABLE.--5 discharge measurements (1967-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	8	4	3.5	8	4.5	3
7	11	7	5.5	10	6.5	5.5
30	14	8.5	7	13	8	6.5

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					110	78	60	45	33	22	14	10	6.5		
1931-60					115	81	61	46	34	23	15	11	6.5		

01-5012.00 Wharton Creek at New Berlin, N.Y.

LOCATION.--Lat 42°37'34", long 75°18'24", at bridge on State Highway 80, 0.8 mile east of New Berlin, Chenango County.

DRAINAGE AREA.--89.8 sq mi.

RECORDS AVAILABLE.--16 discharge measurements (1956-62, 1964).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	13.5	9				
7	14.5	10				
30	18	11.5				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							75	54	38	26	18	14	11		

01-5015.00 Sage Brook near South New Berlin, N.Y.

LOCATION.--Lat 42°31'52", long 75°25'31", on right bank 1.5 miles upstream from mouth and 2.5 miles west of South New Berlin, Chenango County.

DRAINAGE AREA.-- 0.70 sq mi.

RECORDS AVAILABLE.-- November 1932 to September 1967.

AVERAGE DISCHARGE.--34 years, 1.03 cfs

MINIMUM DAILY DISCHARGE.--Trace

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1933-67

1.1	2	5	10	25	50
15.6	32.6	60.3	87.0	133	179

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1934-59			1934-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.014	0.001	Trace	0.012	0.001	0
7	.019	.003	Trace	.016	.003	0.001
30	.034	.007	.004	.028	.008	.004

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1934-67	9	3.9	2.5	1.5	.94	.64	.44	.29	.16	.07	.03	.015	.003	.001	0
1931-60	10	4.0	2.6	1.5	1.0	.70	.49	.31	.18	.08	.03	.02	.004	.002	.001

01-5015.10 Great Brook at Holmesville, N.Y.

LOCATION.--Lat 42°31'04", long 75°23'35", at bridge on State Highway 8, 0.5 mile north of Holmesville, and 0.7 mile upstream from mouth, Chenango County.

DRAINAGE AREA.--25.9 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.0	0.2				
7	1.5	.3				
30	2.0	.6				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											3.2	1.6	0.5		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5019.00 Butternut Creek near Garrattsville, N.Y.

LOCATION.--Lat 42°40'04", long 75°08'41", at bridge 500 ft east of county road connecting Burlington and Garrattsville, and 2 miles northeast of Garrattsville, Otsego County.

DRAINAGE AREA.--16 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1	0.4	0.4	1.1	0.5	0.3
7	1.7	1.1	.9	1.7	1.0	.9
30	2.2	1.5	1.2	2.1	1.3	1.1

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967				34	23	16	12	8.4	6.0	3.8	2.3	1.6	0.9		
1931-60				33	23	17	12	8.7	6.3	4.1	2.6	1.7	0.9		

01-5020.00 Butternut Creek at Morris, N.Y.

LOCATION.--Lat 42°32'43", long 75°14'22", Otsego County, on right bank 15 ft upstream from bridge on State Highway 23 at Morris, and 0.2 mile upstream from Calhoun Creek.

DRAINAGE AREA.--59.7 sq mi.

RECORDS AVAILABLE.--June 1938 to September 1967.

AVERAGE DISCHARGE.--29 years, 93.4 cfs

MINIMUM DAILY DISCHARGE.--1.3 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1938-67

1.1	2	5	10	25	50
1,021	1,898	2,674	3,137	3,668	4,028

1,480 cfs on June 22, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1939-59			1939-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	3.6	1.6	1.3	4.3	1.8	1.2
7	6.5	4.3	3.3	6.4	3.9	3.2
30	8.2	5.7	4.5	8.2	5.0	4.3

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1939-67	700	320	220	140	94	66	48	34	24	15	8.8	6.1	3.3	2.7	1.8
1931-60	700	320	215	135	94	68	49	35	25	16	9.9	6.7	3.4	2.7	1.7

REMARKS.--Diurnal fluctuation at low flow caused by mill above station.

01-5025.00 Unadilla River at Rockdale, N.Y.

LOCATION.--Lat 42°22'40", long 75°24'23", Chenango County, on right bank 400 ft downstream from Chenango-Otsego County highway bridge at Rockdale, and 0.7 mile downstream from Kent Brook.

DRAINAGE AREA.--520 sq mi.

RECORDS AVAILABLE.--November 1929 to September 1933, January 1937 to September 1967.

AVERAGE DISCHARGE.--33 years, 802 cfs

MINIMUM DAILY DISCHARGE.--27 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1930-33,1937-67

1.1	2	5	10	25	50
5,400	9,070	12,100	13,900	16,000	17,300

6,640 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1931-32, 1938-59			1931-32, 1938-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	66	38	32	64	37	30
7	72	42	35	70	40	32
30	98	56	45	88	49	38

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-33, 1938-67	5,800	2,800	1,900	1,160	820	580	420	300	210	140	90	66	42	38	30
1931-60	5,800	2,900	2,000	1,300	890	630	450	320	230	160	105	78	52	45	36

01-5025.50 Guilford Creek at East Guilford, N.Y.

LOCATION.--Lat 42°20'25", long 75°24'27", at former railroad bridge at East Guilford, and 0.5 mile upstream from mouth, Chenango County.

DRAINAGE AREA.--17.8 sq mi.

RECORDS AVAILABLE.--9 discharge measurements (1966-68). a/

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.3	0.1	0.05	0.3	0.1	0.05
7	.4	.15	.08	.35	.13	.08
30	.6	.25	.15	.6	.2	.15

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					20	12	8	4.8	2.8	1.5	0.6	0.35	0.15		
1931-60					20	13	8	5.0	3.0	1.6	.7	.4	.15		

REMARKS.--Unincorporated village of Guilford, about 6 miles northwest of station, uses about 0.1 cfs for public water supply. Most of this water is returned to the ground through septic tanks.

a/ Also 9 measurements (1962-68) at Route 8 bridge 800 ft downstream, in underflow zone; not equivalent at flows less than 0.5 cfs.

01-5026.70 Big Brook above Bennettsville, N.Y.

LOCATION.--Lat 42°15'11", long 75°25'25", at bridge on county road 0.5 mile northeast of State Highway 206, and 1.2 miles east of Bennettsville, Chenango County.

DRAINAGE AREA.--25.4 sq mi.

RECORDS AVAILABLE.--9 discharge measurements (1966-68)

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.5	0.2	0.15	0.5	0.2	0.15
7	.6	.3	.25	.6	.25	.2
30	1.0	.4	.3	.9	.35	.25

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					35	22	12	8	4.5	2.2	1.0	0.6	0.25		
1931-60					40	23	13	9	5.0	2.5	1.2	.8	.35		

REMARKS.--Station 5026.80 on the same stream is in an underflow zone; therefore, its low flow data cannot be used to estimate flow at sites upstream or downstream from the measuring site.

01-5027.00 Kelsey Creek at Afton, N.Y.

LOCATION.--Lat 42°13'49", long 75°31'23", at bridge on State Highway 7, at Afton, Chenango County.

DRAINAGE AREA.--41.2 sq mi.

RECORDS AVAILABLE.--12 discharge measurements (1957-62, 1964).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.8	0.1				
7	1.2	.2				
30	3.7	.6				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							36	26	17	9.7	3.6	1.5	0.3		

REMARKS.-- This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5027.10 Wylie Brook at Harpursville, N.Y.

LOCATION.--Lat 42°11'26", long 75°37'02", at bridge on State Highway 7, 0.5 mile northeast of Harpursville, and 0.7 mile upstream from mouth, Broome County.

DRAINAGE AREA.--24.8 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1962-65).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	1.0	Trace				
7	1.5	0.1				
30	2.5	.6				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											2.9	1.6	0.3		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5027.12 Belden Brook at Harpursville, N.Y.

LOCATION.--Lat 42°10'50", long 75°37'26", at bridge on Maple Street, at Harpursville, Broome County, 0.5 mile upstream from mouth.

DRAINAGE AREA.--11.6 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1962-65).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.4	Trace				
7	.6	Trace				
30	1.3	0.3				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.5	0.8	0.1		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5027.20 Sage Creek at Ouaquaga, N.Y.

LOCATION.--Lat 42°07'04", long 75°39'22", at bridge on State Highway 79, 0.1 mile upstream from mouth, 1 mile south of Ouaquaga, Broome County.

DRAINAGE AREA.--13.0 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1962-65).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.1	0				
7	.1	Trace				
30	.2	0.1				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											0.2	0.1	0.01		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5027.40 Tuscarora Creek at Damascus, N.Y.

LOCATION.--Lat 42°03'20", long 75°36'46", at bridge on Old State Highway 17, at Damascus, 0.5 mile upstream from mouth, Broome County.

DRAINAGE AREA.--8.74 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1962-65).

PEAK DISCHARGES.--255 cfs on July 28, 1951.

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.1	0				
7	.3	0				
30	.7	0.1				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.0	0.4	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5028.00 Snake Creek at Corbettsville, N.Y.

LOCATION.--Lat 42°00'53", long 75°47'20", at bridge on State Highway 7A, at Corbettsville, Broome County.

DRAINAGE AREA.--75.0 sq mi.

RECORDS AVAILABLE.--14 discharge measurements (1956-62, 1964).

PEAK DISCHARGES.--207 cfs on April 15, 1957.

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.1	0				
7	.3	0				
30	2.4	Trace				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							63	45	30	17	4.4	0.4	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5028.99 Little Snake Creek above State Highway 7 at Conklin, N.Y.

LOCATION.--Lat 42°01'49", long 75°48'32", at bridge on Fallbrook Road, 0.4 mile west of State Highway 7, 0.4 mile southwest of Conklin, Broome County.

DRAINAGE AREA.--30.6 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1966-67).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.6	0.2	0.1	0.5	0.2	0.1
7	.7	.25	.15	.6	.2	.15
30	1.1	.35	.2	1.0	.3	.2

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-67					29	17	11	6	3.5	1.8	0.9	0.5	0.25		
1931-60					29	17	11	6.5	3.7	2.0	1.0	.6	.25		

REMARKS.--Station 01-5029.00 on the same stream is in an underflow zone; therefore, its low flow data cannot be used to determine flow upstream or downstream from the measuring site.

01-5030.00 Susquehanna River at Conklin, N.Y.

LOCATION.--Lat 42°02'07", long 75°48'12", Broome County, on left bank at old bridge abutment, 500 ft upstream from highway bridge at Conklin, 0.7 mile downstream from Little Snake Creek, and 3.5 miles downstream from state line.
DRAINAGE AREA.--2,232 sq mi.
RECORDS AVAILABLE.--November 1912 to September 1967.
AVERAGE DISCHARGE.--54 years, 3,531 cfs
MINIMUM DAILY DISCHARGE.--105 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1913-67

1.1	2	5	10	25	50
21,075	32,652	42,636	48,703	55,860	60,877

26,500 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1914-59			1913-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	310	160	120	290	160	120
7	350	185	150	320	180	140
30	450	225	175	410	210	160

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1914-67	23,000	12,000	8,400	5,200	3,600	2,650	2,000	1,450	1,050	700	430	310	180	155	118
1931-60	24,000	12,000	8,600	5,300	3,700	2,700	2,000	1,450	1,000	670	420	315	210	190	150

REMARKS.--Diurnal fluctuation at low flow caused by mill several miles above station. Minor regulation by upstream lakes and reservoirs.

01-5033.00 Park Creek near Binghamton, N.Y.

LOCATION.--Lat 42°05'38", long 75°48'29", at bridge on U.S. Highway 11, 0.3 mile upstream from mouth, and 2.0 miles east of city line of Binghamton, Broome County.
DRAINAGE AREA.--15.7 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--3,070 cfs on October 11-12, 1962

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.2	0				
7	.5	0				
30	1.2	0.1				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.5	0.4	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5047.80 Sangerfield River near Earlville, N.Y.

LOCATION.--Lat 42°43'05", long 75°32'26", at bridge on State Highway 12B, 0.1 mile upstream from mouth, and 1.5 miles south of Earlville, Chenango County.
DRAINAGE AREA.--61.4 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	11	3				
7	14	3.5				
30	21	6				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											22	14	4.9		

REMARKS.--Source of water supply for village of Earlville. Most of water diverted out of basin.

01-5048.00 Pleasant Brook near Sherburne, N.Y.

LOCATION.--Lat 42°42'04", long 75°32'15", at bridge on dirt road, 0.2 mile downstream from Cold Spring Brook, 0.5 mile north of State Highway 80, and 2.5 miles northwest of Sherburne, Chenango County.
DRAINAGE AREA.--38.6 sq mi.

RECORDS AVAILABLE.--17 discharge measurements (1956-62, 1964).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.4	0				
7	.8	0				
30	1.8	0.2				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							24	15	9.2	4.8	1.8	0.8	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5049.00 Handsome Brook at Sherburne, N.Y.

LOCATION.--Lat 42°41'26", long 75°30'15", at bridge on State Highway 12B, 0.4 mile upstream from mouth, 0.5 mile north of village line at Sherburne, Chenango County.

DRAINAGE AREA.--37.9 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	3	0.5				
7	4	1				
30	7	2				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											7	4	1		

01-5050.00 Chenango River at Sherburne, N.Y.

LOCATION.--Lat 42°40'43", long 75°30'39", Chenango County, on right bank 20 ft downstream from bridge on State Highway 80, 0.5 mile west of Sherburne, and 0.5 mile downstream from Handsome Brook.

DRAINAGE AREA.--263 sq mi

RECORDS AVAILABLE.--May 1938 to September 1967.

AVERAGE DISCHARGE.--29 years, 388 cfs

MINIMUM DAILY DISCHARGE.--14 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1938-67

1.1	2	5	10	25	50
2,518	4,631	6,367	7,342	8,401	9,084

7,500 cfs on June 22, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1939-59			1939-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	38	20	16	34	19	14
7	42	21	18	37	20	15
30	51	25	20	46	24	18

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1940-67	2,550	1,290	920	580	390	290	215	150	105	72	48	36	22	20	16
1931-60	2,700	1,350	940	590	420	310	230	165	115	80	50	37	24	21	18

REMARKS.--Slight diurnal fluctuation at low flow caused by mill several miles above station. Water diverted from Chenango River basin into Oriskany Creek through Oriskany Creek feeder at Solsville for more than 100 years. Incomplete records (1954-58) indicate that amount of water diverted averages about 10 cfs during summer months.

01-5050.20 Cold Brook near North Norwich, N.Y.

LOCATION.--Lat 42°35'39", long 75°31'48", at bridge on State Highway 12, 0.4 mile upstream from mouth, and 1.6 miles south of North Norwich, Chenango County.

DRAINAGE AREA.--6.50 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.3	0				
7	.5	Trace				
30	1.0	0.3				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.0	0.6	0.1		

01-5055.00 Canasawacta Creek near South Plymouth, N.Y.

LOCATION.--Lat 42°33'49", long 75°33'09", Chenango County, on right bank 1.4 miles southeast of South Plymouth, 2 miles northwest of Norwich, 2.8 miles downstream from East Branch, and 4.2 miles upstream from mouth.

DRAINAGE AREA.--57.9 sq mi.

RECORDS AVAILABLE.--September 1945 to September 1967.

AVERAGE DISCHARGE.--22 years, 97.2 cfs

MINIMUM DAILY DISCHARGE.--0.3 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1945-67

1.1	2	5	10	25	50
1,222	2,583	4,025	5,001	6,235	7,148

5,000 cfs on June 22, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1946-59			1946-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.4	0.45		1.3	0.4	0.3
7	2.5	.85		2.1	.7	.4
30	5.3	2.1		4.2	1.4	.9

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1946-67	740	350	230	140	96	68	48	33	20	10	4.5	2.5	0.7	0.6	0.4
1931-60	800	370	240	150	100	72	51	35	22	11	5.4	3.4	1.2	.8	.5

REMARKS.--Slight diurnal fluctuation caused by grist mill 1.8 miles above station.

01-5059.20 Mill Brook near Oxford, N.Y.

LOCATION.--Lat 42°25'44", long 75°37'26", at bridge on State Highway 12, 0.25 mile upstream from mouth, and 1.7 miles south of Oxford, Chenango County.

DRAINAGE AREA.--13.0 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	1.0	0.1				
7	1.5	.3				
30	2.5	.7				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											2.5	1.5	0.5		

01-5059.50 Bowman Creek near Tyner

LOCATION.--Lat 42°24'11", long 75°38'08", at bridge on State Highway 12, 0.2 mile upstream from mouth, and 2.4 miles southeast of Tyner, Chenango County.

DRAINAGE AREA.--26.8 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0.5	0				
7	1	0				
30	3.5	0.1				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											3	1.0	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5060.50 Bear Brook at Walker Corners, N.Y.

LOCATION.--Lat 42°23'04", long 75°35'03", at bridge on Roys Road, 0.4 mile south of Walker Corners, Chenango County.

DRAINAGE AREA.--15 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0.15	0.04	0.02	0.15	0.04	0.02
7	.3	.13	.07	.25	.12	.06
30	.4	.2	.09	.4	.15	.08

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					18	11	7	4.4	2.5	1.0	0.45	0.25	0.1		
1931-60					19	12	7.5	4.6	2.7	1.1	.5	.3	.09		

01-5063.00 Wheeler Brook near Brisben, N.Y.

LOCATION.--Lat 42°20'43", long 75°42'38", at bridge on East River Road, 0.15 mile upstream from mouth, and 2.1 miles southwest of Brisben, Chenango County.

DRAINAGE AREA.--10.6 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0.7	0.1				
7	1.0	.2				
30	1.8	.5				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.8	1.1	0.3		

01-5063.50 Tillotson Creek near Brisben, N.Y.

LOCATION.--Lat 42°21'16", long 75°42'50", at bridge on State Highway 12, 0.4 mile upstream from mouth, and 2 miles southwest of Brisben, Chenango County.

DRAINAGE AREA.--9.65 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record: Through 1959						
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0.2	0				
7	.6	0				
30	1.3	0.1				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1	0.6	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5064.00 Spring Brook near Brisben, N.Y.

LOCATION.--Lat 42°21'01", long 75°43'58", at bridge on State Highway 12, 0.2 mile upstream from mouth, and 2.9 miles southwest of Brisben, Chenango County.

DRAINAGE AREA.--17.5 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66)

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:Through 1959						
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0.4	0				
7	.7	0				
30	1.9	0				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60												0.6	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5070.00 Chenango River at Greene, N.Y.

LOCATION.--Lat 42°19'28", long 75°46'18", Chenango County, on left bank 0.3 mile downstream from highway bridge in Greene, and 0.6 mile downstream from Birdsall Brook.

DRAINAGE AREA.--593 sq mi.

RECORDS AVAILABLE.--February 1937 to September 1967

AVERAGE DISCHARGE.--30 years, 887 cfs

MINIMUM DAILY DISCHARGE.--38 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1937-67

1.1	2	5	10	25	50
5,773	9,395	12,474	14,308	16,428	17,883

12,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record: 1938-59				1938-66		
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	75	47	38	75	47	34
7	85	50	41	80	50	40
30	110	60	48	100	57	45

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-67	5,800	3,000	2,100	1,300	940	680	460	340	245	160	104	76	51	46	39
1931-60	6,000	3,200	2,200	1,400	960	710	530	370	260	175	110	80	53	48	42

REMARKS.--Diversion above station at Solsville through Oriskany Creek feeder into Mohawk River in Hudson River basin for New York State Barge Canal operation. Diversion averages about 10 cfs during the summer months.

01-5071.00 Five Streams near Smithville Flats, N.Y.

LOCATION.--Lat 42°27'28", long 75°47'48", at bridge on Hoffman Road, 0.3 mile upstream from Forty Brook, 2.0 miles upstream from mouth, and 4.4 miles north of Smithville Flats, Chenango County.

DRAINAGE AREA.--10.1 sq mi.

RECORDS AVAILABLE.--9 discharge measurements (1964, 1966-68).

PEAK' DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record: Through 1959				Through 1966		
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0.1			0.1		
7	.2			.15		
30	.8			.6		

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967									3	1.4	0.5	0.1			
1931-60									3	1.4	.6	.15			

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5074.70 Red Brook at Smithville Flats, N.Y.

LOCATION.--Lat 42°24'19", long 75°48'41", on right bank 400 ft upstream from bridge on State Highway 220, 2,500 ft upstream from mouth, and 0.7 mile north of Smithville Flats, Chenango County.

DRAINAGE AREA.--7.06 sq mi.

RECORDS AVAILABLE.--July 1966 to September 1968

PEAK DISCHARGES.--110 cfs on November 2, 1967

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.06	0.007	Trace	0.05	0.007	Trace
7	.08	.01	Trace	.07	.01	Trace
30	.2	.02	0.006	.15	.02	0.006

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967	54	29	20	13	9.5	7	4	2	0.9	0.35	0.1	0.05	0.01		
1931-60	60	28	20	13	9.5	7	3.7	2	0.9	.35	.15	.07	.01		

(Discharge, in cfs, which was equaled or exceeded for indicated percentage of time)

01-5075.00 Genegantslet Creek at Smithville Flats, N.Y.

LOCATION.--Lat 42°23'34", long 75°48'15", Chenango County, on left bank 400 ft downstream from highway bridge at Smithville Flats, and 0.2 mile downstream from Pond Brook.

DRAINAGE AREA.--82.3 sq mi.

RECORDS AVAILABLE.--June 1938 to September 1967.

AVERAGE DISCHARGE.--29 years, 135 cfs

MINIMUM DAILY DISCHARGE.--0.5 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1938-67

1.1	2	5	10	25	50
1,438	2,789	3,888	4,491	5,129	5,530

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1939-59			1939-66		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	5.0	1.4	0.6	4.6	1.4	0.55
7	6.0	1.9	.9	5.4	1.9	.9
30	9.5	2.7	1.2	8.0	2.5	1.2

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1939-67	1,200	510	315	190	125	84	60	40	25	14	7.4	4.5	2.0	1.0	0.6
1931-60	1,250	500	315	180	120	82	58	40	25	14	8.1	5.4	1.8	1.0	.6

(Discharge, in cfs, which was equaled or exceeded for indicated percentage of time)

REMARKS.--Diurnal fluctuation at low and medium flow caused by gristmill 800 ft above station.

01-5079.50 West Branch Tioughnioga Creek near Cuyler, N.Y.

LOCATION.--Lat 42°47'06", long 75°57'47", at bridge in Keeney, 3.4 miles north of Cuyler, Cortland County.

DRAINAGE AREA.--35.0 sq mi.

RECORDS AVAILABLE.--13 discharge measurements (1956-60, 1962,1964).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	5	3.5				
7	6	4				
30	7	4.5				

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							33	24	17	12	7.5	5.9	4.4		

(Discharge, in cfs, which was equaled or exceeded for indicated percentage of time)

01-5079.75 Muller Gulf Creek near Cuyler, N.Y.

LOCATION.--Lat 42°43'32", long 75°58'46", on right bank 0.4 mile upstream from bridge, 0.5 mile upstream from mouth, and 2 miles southwest of Cuyler, Cortland County.

DRAINAGE AREA.--2.67 sq mi.

RECORDS AVAILABLE.--July 1966 to September 1968.

PEAK DISCHARGES.--154 cfs on January 24, 1967
187 cfs on March 23, 1968

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.04			0.03		
7	.05	0.01		.04	0.01	
30	.15	.01		.06	.01	

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967	30	16	10	7	4.8	3.7	2.5	1.8	0.8	0.3	0.1	0.02			
1931-60	33	17	11	7.5	5.0	3.8	2.8	2.0	1.0	.4	.15	.03			

(Discharge, in cfs, which was equaled or exceeded for indicated percentage of time)

01-5080.00 Shackham Brook near Truxton, N.Y.

LOCATION (Revised).--Lat 42°46'02", long 76°01'07", Cortland County, on right bank 0.1 mile upstream from small tributary, 1 mile upstream from mouth, and 5 miles north of Truxton.
DRAINAGE AREA.--2.95 sq mi.
RECORDS AVAILABLE.--November 1932 to September 1967.
AVERAGE DISCHARGE.-- 34 years, 5.33 cfs
MINIMUM DAILY DISCHARGE.-- 0.01 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1933-67

1.1	2	5	10	25	50
83.1	178	278	345	428	489

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1934-59			1934-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.11	0.06	0.04	0.10	0.04	0.02
7	.13	.06	.05	.12	.05	.03
30	.18	.09	.06	.17	.07	.06

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
1934-67	46	20	13	7.6	5.0	3.5	2.4	1.6	0.78	0.33	0.17	0.12	0.07	0.06	0.04
1931-60	50	21	14	8.1	5.6	3.9	2.6	1.7	.90	.36	.19	.13	.08	.07	.06

REMARKS.--This station was operated in connection with a study of the effect of reforestation on streamflow.

01-5082.00 Labrador Creek at Truxton, N.Y.

LOCATION.--Lat 42°42'43", long 76°01'51", at bridge on State Highway 13, at Truxton, and 0.8 mile upstream from mouth, Cortland County.
DRAINAGE AREA.--13.7 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.1	0				
7	1.4	0.1				
30	2.2	.4				

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
1931-60											2.1	1.3	0.3		

01-5085.00 Albright Creek at East Homer, N.Y.

LOCATION.--Lat 42°40'09", long 76°06'13", Cortland County, on left bank 0.2 mile upstream from highway bridge at East Homer and 0.5 mile upstream from mouth.
DRAINAGE AREA.--6.81 sq mi.
RECORDS AVAILABLE.--October 1938 to September 1967.
AVERAGE DISCHARGE.--28 years, 11.7 cfs
MINIMUM DAILY DISCHARGE.--0 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1939-67

1.1	2	5	10	25	50
180	400	597	709	832	910

1,200 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1940-59			1940-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.27	0.06	0.02	0.23	0.03	0
7	.37	.08	.03	.30	.04	0.01
30	.74	.21	.09	.60	.12	.06

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
1940-67	94	40	27	17	12	8.3	6.0	4.0	2.4	1.2	0.52	0.29	0.10	0.06	0.02
1931-60	96	41	28	17	12	8.3	6.0	4.1	2.6	1.4	.67	.37	.14	.10	.06

REMARKS.--This station was operated in connection with a study of the effect of reforestation on streamflow.

01-5085.50 East Branch Tioughnioga River near Cortland, N.Y.

LOCATION.--Lat 42°37'35", long 75°08'56", at bridge on county road off State Highway 13, 2.2 miles northeast of Cortland, Cortland County.
DRAINAGE AREA.--193 sq mi.

RECORDS AVAILABLE.--14 discharge measurements (1956-61, 1964).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	20	9				
7	24	10				
30	30	11				

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
1931-60							155	115	79	53	30	21	13		

01-5087.00 Cold Brook at Little York, N.Y.

LOCATION.--Lat 42°41'08", long 76°10'11", at bridge on State Highway 281, 0.4 mile upstream from mouth, and 0.75 mile south of Little York, Cortland County.

DRAINAGE AREA.-- 15.4 sq mi.

RECORDS AVAILABLE.-- 8 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0.6	0				
7	1.0	0				
30	1.7	0.1				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											2	0.8	0.1		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5088.00 Factory Brook at Homer, N.Y.

LOCATION.--Lat 42°38'39", long 76°11'18", at bridge on State Highway 41, at Homer, about 1 mile upstream from mouth, Cortland County.

DRAINAGE AREA.--15.8 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	4.1	1.4				
7	5.1	1.7				
30	6.5	2.6				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											6.6	4.7	2.3		

01-5088.03 West Branch Tioughnioga River at Homer, N.Y.

LOCATION.--Lat 42°38'18", long 76°10'36", on right bank 20 ft upstream from Water Street bridge in Homer, Cortland County, 500 ft east of U.S. Highway 11, and 0.3 mile downstream from Factory Brook.

DRAINAGE AREA.--71.5 sq mi.

RECORDS AVAILABLE.--November 1966 to September 1968.

PEAK DISCHARGES.--1,270 cfs on July 8, 1935.

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	16	9		15	10	
7	18	10		16	10	
30	20	11		18	12	

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967		310	230	150	110	86	66	50	37	26	19	15	11		
1931-60		320	230	155	115	90	70	54	40	29	21	16	11		

01-5089.80 West Branch Tioughnioga River at Cortland, N.Y.

LOCATION.--Lat 42°36'27", long 76°10'01", at bridge on State Highway 13, at Cortland, Cortland County.

DRAINAGE AREA.--100 sq mi.

RECORDS AVAILABLE.--17 discharge measurements (1956-62, 1964).

PEAK DISCHARGES.--1,460 cfs on July 8, 1935

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	23	11				
7	26	13				
30	30	17				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							100	75	58	44	32	25	17		

01-5090.00 Tioughnioga River at Cortland, N.Y.

LOCATION.--Lat 42°36'10", long 76°09'35", Cortland County, on right bank at east end of Elm Street at Cortland, 0.4 mile downstream from confluence of East and West Branches.

DRAINAGE AREA.--292 sq mi.

RECORDS AVAILABLE.--May 1938 to September 1967.

AVERAGE DISCHARGE.--29 years, 470 cfs

MINIMUM DAILY DISCHARGE.--17 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1939-67

1.1	2	5	10	25	50
3,049	5,948	8,681	10,386	12,408	13,820

7,730 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1939-59			1939-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	48	22	15	43	25	17
7	53	26	20	46	28	20
30	60	29	23	54	33	24

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1939-67	3,200	1,550	1,100	680	470	340	250	180	125	84	56	44	30	24	21
1931-60	3,500	1,600	1,100	700	490	360	265	195	140	95	63	47	31	27	21

REMARKS.--Diurnal fluctuation at low and medium flow caused by powerplants in mills on West Branch. The flow from 14.0 sq mi of the Middle Branch during the summer months may be diverted into DeRuyter Reservoir in Oswego River basin.

01-5090.20 Trout Brook near Blodgett Mills, N.Y.

LOCATION.--Lat 42°35'09", long 76°07'47", at bridge on U.S. Highway 11, 0.4 mile upstream from mouth, and 1.2 miles north of Blodgett Mills, Cortland County.

DRAINAGE AREA.--40.5 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.5	0.3				
7	2.5	.4				
30	4.0	.8				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											4.5	2.0	0.6		

01-5093.00 Hunts Creek at Marathon, N.Y.

LOCATION.--Lat 42°27'21", long 76°01'53", at bridge on County Highway 116, 0.2 mile downstream from unnamed tributary, 0.2 mile north of Marathon village line, and 1.3 miles upstream from mouth, Cortland County.

DRAINAGE AREA.--10.8 sq mi.

RECORDS AVAILABLE.--15 discharge measurements (1935, 1962-68).

PEAK DISCHARGES.--6,430 cfs on July 8, 1935

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.4	0.1	0.06	0.35	0.1	0.06
7	.45	.15	.08	.4	.15	.08
30	.7	.2	.1	.6	.2	.1

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					15	10	6.3	4.1	2.3	1.2	0.6	0.35	0.15		
1931-60					15	10	6.5	4.3	2.5	1.3	.65	.4	.15		

REMARKS.--Slope-area determination of peak discharge on July 8, 1935 published as "Willett Creek".

01-5094.00 Jennings Creek at Killawog, N.Y.

LOCATION.--Lat 42°24'05", long 76°01'17", at bridge on Whiting Hill Road, at Killawog, and 0.3 mile upstream from mouth, Broome County.

DRAINAGE AREA.--14.4 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.9	0.1				
7	1.3	.1				
30	1.8	.4				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.9	1.1	.3		

01-5095.00 Dudley Creek at Lisle, N.Y.

LOCATION.--Lat 42°21'19", long 76°00'17", at bridge on Whiting Hill Road, at Lisle, 0.1 mile upstream from mouth, Broome County.

DRAINAGE AREA.--31.8 sq mi.

RECORDS AVAILABLE.--Daily discharges July 1938 to June 1940, 7 discharge measurements (1962-66).

PEAK DISCHARGES.--16,200 cfs on July 8, 1935.

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record: Through 1959						
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	3.0	1.5				
7	3.5	1.8				
30	4.5	2.4				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							22	16	11	7.5	4.8	3.5	2.1		

REMARKS.--Duration and frequency curves developed using results of discharge measurements and mean monthly discharges.

01-5098.00 Mud Creek at Union Valley, N.Y.

LOCATION.--Lat 42°37'56", long 75°52'43", at bridge, 0.3 mile east of Union Valley, Chenango County.

DRAINAGE AREA.--23.8 sq mi.

RECORDS AVAILABLE.--12 discharge measurements (1957-62).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record: Through 1959						
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	2.5	1.4				
7	3.1	1.6				
30	4.6	2.3				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							24	18	13	8.3	4.6	3.2	1.9		

01-5099.00 Pond Creek at Taylor, N.Y.

LOCATION.--Lat 42°34'01", long 75°53'33", at bridge on State Highway 26, at Taylor, and 0.6 mile upstream from mouth, Cortland County.

DRAINAGE AREA.--7.49 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record: Through 1959						
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.4	0				
7	.7	0				
30	1.2	0				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.3	0.5	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5100.00 Otselic River at Cincinnatus, N.Y.

LOCATION.--Lat 42°32'28", long 75°53'58", Cortland County, on right bank 150 ft upstream from Mead Brook and 300 ft downstream from bridge on County Highway 159 at Cincinnatus.

DRAINAGE AREA.--147 sq mi.

RECORDS AVAILABLE.--June 1938 to September 1964.

AVERAGE DISCHARGE.--26 years, 266 cfs

MINIMUM DAILY DISCHARGE.--4.1 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1939-64

1.1	2	5	10	25	50
3,124	4,586	5,912	6,754	7,788	8,541

5,530 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record: 1939-59				1938-64		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	14	7.7	5.2	14	6.3	4.0
7	17	8.9	5.7	17	6.9	4.3
30	22	12	7.7	22	8.5	5.0

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1939-64	2,300	940	600	360	245	175	125	90	60	38	21	15	8.4	6.7	4.6
1931-60	2,200	950	600	360	250	185	135	98	68	41	24	17	9.7	8.0	5.6

01-5105.00 Otselic River near Upper Lisle, N.Y.

LOCATION.--Lat 42°25'18", long 75°56'59", Broome County, on left bank 300 ft downstream from Salzbury Bridge, 0.5 mile downstream from Barry Run, 2 miles upstream from Upper Lisle, and 9 miles upstream from Whitney Point Dam.

DRAINAGE AREA.-- 217 sq mi.

RECORDS AVAILABLE.-- January 1937 to September 1967

AVERAGE DISCHARGE.--30 years, 376 cfs

MINIMUM DAILY DISCHARGE.--7.4 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1935, 1937-67

1.1	2	5	10	25	50
3,760	6,100	8,400	10,400	12,200	13,700

15,400 cfs on July 8, 1935

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1938-59			1938-66		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	22	11	7.8	22	11	8.4
7	25	12	9	24	13	9
30	32	16	11	30	16	11

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-67	3,000	1,400	880	500	350	250	180	129	88	54	31	22	14	13	11
1931-60	3,300	1,400	870	530	370	275	200	145	100	60	34	24	14	13	10

01-5107.00 Merrill Creek at Upper Lisle, N.Y.

LOCATION.--Lat 42°24'14", long 75°58'32", at bridge, 0.2 mile upstream from mouth, 0.8 mile northwest of Upper Lisle, Broome County.

DRAINAGE AREA.--20.9 sq mi.

RECORDS AVAILABLE.--14 discharge measurements (1935, 1956-62).

PEAK DISCHARGES.--15,100 cfs on July 8, 1935

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.9	0.5				
7	1.1	.6				
30	1.5	.6				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							13	8.7	5.2	2.7	1.4	1.0	0.6		

01-5115.00 Tioughnioga River at Itaska, N.Y.

LOCATION.--Lat 42°17'55", long 75°54'30", Broome County, on right bank at Itaska, 3.7 miles downstream from Otselic River and village of Whitney Point and 6 miles upstream from mouth.

DRAINAGE AREA.--730 sq mi.

RECORDS AVAILABLE.--October 1929 to June 1967.

AVERAGE DISCHARGE.--37 years, 1212 cfs a/

MINIMUM DAILY DISCHARGE.--40 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1930-41.

1.1	2	5	10	25	50
9,470	14,300	23,500	33,100	51,100	70,200

11,500 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1930-59			1930-66		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	92	51	43	86	50	40
7	100	58	49	93	57	48
30	130	73	58	122	73	58

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1930-66	8,200	4,500	3,100	1,750	1,150	620	580	430	310	205	128	96	65	58	48
1931-60	8,400	4,600	3,100	1,850	1,250	890	670	490	330	215	140	100	67	60	50

REMARKS.--Flood flows partly regulated since March 1942 by Whitney Point Reservoir. During summer months, flow from 14.0 sq mi of Middle Branch may be diverted into DeRuyter Reservoir in Oswego River basin.

a/ Adjusted for storage since September 1942.

01-5115.50 Halfway Brook near Triangle, N.Y.

LOCATION.--Lat 42°18'22", long 75°52'31", at bridge on South St., 500 ft west of Pixley Road, and 2.3 miles south of Triangle, Broome County.

DRAINAGE AREA.--18.5 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1966-67).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.2			0.2		
7	.3			.25		
30	.55			.4		

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					29	16	9	5	2.4	1.0	0.35	0.2			
1931-60					28	16	8.8	5	3	1.3	.55	.3			

01-5116.00 Halfway Brook near Itaska, N.Y.

LOCATION.--Lat 42°17'04", long 75°53'23", at bridge on State Highway 79, 0.1 mile upstream from mouth, and 1.4 miles southeast of Itaska, Broome County.

DRAINAGE AREA.--21.8 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record: Through 1959						
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.6	0				
7	1.0	0				
30	2.1	Trace				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											2.1	0.9	0		

01-5125.00 Chenango River near Chenango Forks, N.Y.

LOCATION.--Lat 42°13'05", long 75°50'55", Broome County, on left bank in Chenango Valley State Park, 1.2 miles downstream from Tioughnioga River and village of Chenango Forks.

DRAINAGE AREA.--1,483 sq mi.

RECORDS AVAILABLE.--November 1912 to September 1967.

AVERAGE DISCHARGE.--54 years, 2383 cfs

MINIMUM DAILY DISCHARGE.--88 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1913-67

1.1	2	5	10	25	50
15,300	23,200	30,800	36,300	45,200	54,000

26,200 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1914-59			1914-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	220	130	102	210	125	100
7	240	140	110	225	135	105
30	300	165	130	285	165	125

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1914-67	15,500	8,500	5,800	3,500	2,400	1,750	1,260	920	660	460	290	225	145	128	103
1931-60	16,500	8,500	5,800	3,500	2,400	1,750	1,250	920	650	440	280	210	140	125	105

REMARKS.--Since March 1942, flood flows partly regulated by Whitney Point Reservoir. During summer months 10-20 cfs diverted out of basin.

01-5125.50 Page Brook near Port Crane, N.Y.

LOCATION.--Lat 42°11'53", long 75°49'31", at bridge on town road, 0.25 mile west of State Highway 369, 0.9 mile upstream from mouth, and about 2 miles north of Port Crane, Broome County.

DRAINAGE AREA.--34.1 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record: Through 1959						
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.8	0.3				
7	1.0	.4				
30	1.8	.5				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.9	0.8	0.3		

01-5127.80 Thomas Creek at Chenango Bridge, N.Y.

LOCATION.--Lat 42°10'08", long 75°52'56", Broome County, at bridge on state highway at Chenango Bridge, 0.15 mile upstream from mouth, and 0.25 mile aast of State Highway 12.

DRAINAGE AREA.--8.69 sq mi.

RECORDS AVAILABLE.--13 discharge measurements (1962-67).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record: Through 1959				Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	2.0	1.3	1.0	1.9	1.3	1.0
7	2.2	1.5	1.2	2.1	1.5	1.2
30	2.6	1.7	1.4	2.4	1.7	1.3

DURATION DF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					10	8.5	6.8	5.6	4.3	3.4	2.4	2.0	1.6		
1931-60					10	8.5	7.0	5.7	4.5	3.5	2.4	2.1	1.5		

01-5127.97 Castle Creek at Glen Castle, N.Y.

LOCATION.--Lat 42°10'46", long 75°54'07", at end of dirt road, 0.3 mile east of junction of U.S. Highway 11 and West Chenango Road at Glen Castle, Broome County.

DRAINAGE AREA.--27.7 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1966-67). a/

PEAK DISCHARGES.--5,530 cfs on October 30, 1955 at station 5128.

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.3	0.1	0.05	0.3	0.08	0.05
7	.4	.1	.07	.4	.1	.07
30	.7	.2	.09	.6	.15	.09

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					21	14	9	5	2.8	1.7	0.6	0.3	0.1		
1931-60					28	19	13	9	5.7	3.3	1.2	.45	.07		

REMARKS.-- a/ Also available, 14 discharge measurements 1956-64 at station 01-5128.00, 0.8 mile downstream at bridge on U.S. Highway 11 (lat 42°10'06", long 75°54'01", drainage area 28.9 sq mi). Flow per sq mi apparently equivalent within range of measurements (>0.15 cfs), but extreme low flow at station 5128.00 is more likely to fall below tabulated values.

01-5131.90 Little Choconut Creek at Stella, N.Y.

LOCATION.--Lat 42°07'38", long 75°56'42", at bridge on Stella - Ireland Road, at Stella, Broome County, and 2.6 miles upstream from mouth.

DRAINAGE AREA.--12.2 sq mi.

RECORDS AVAILABLE.--29 discharge measurements (1965-69).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.2	0.15	0.1	0.2	0.15	0.1
7	.25	.15	.15	.25	.15	.1
30	.3	.2	.2	.3	.2	.15

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					10	6.0	3.5	2.0	1.1	0.55	0.3	0.2	0.15		
1931-60					10	6.0	3.8	2.2	1.2	.6	.3	.2	.15		

REMARKS.--Flood-control dams constructed upstream 1968.

01-5132.80 Finch Hollow Creek at Oakdale, N.Y.

LOCATION.--Lat 42°07'59", long 75°58'31", 0.2 mile northeast of junction of Finch Hollow and Robinson Hill Roads at Oakdale, Broome County, and 0.4 mile north of Harry L Road.

DRAINAGE AREA.--3.96 sq mi.

RECORDS AVAILABLE.--19 discharge measurements (1966-69).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.06	0.04	0.04	0.06	0.04	0.04
7	.08	.05	.04	.07	.04	.04
30	.09	.06	.05	.09	.05	.04

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					2.8	1.7	1.0	0.6	0.35	0.15	0.09	0.07	0.05		
1931-60					2.8	1.7	1.1	.7	.4	.2	.1	.07	.05		

01-5135.00 Susquehanna River at Vestal, N.Y.

LOCATION.--Lat 42°05'27", long 76°03'23", Broome County, on left bank 400 ft downstream from highway bridge at Vestal, and 0.3 mile upstream from Choconut Creek.

DRAINAGE AREA.--3,960 sq mi.

RECORDS AVAILABLE.--March 1937 to June 1967

AVERAGE DISCHARGE.--29 years, 6,150 cfs

MINIMUM DAILY DISCHARGE.-- 233 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1936-67

1.1	2	5	10	25	50
36,000	54,200	70,800	81,300	94,300	104,000

107,000 cfs on March 18, 1936
50,400 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1938-59			1938-66		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	520	300	250	495	295	230
7	570	330	270	525	315	250
30	690	380	320	650	370	290

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-66	41,000	22,000	15,000	9,200	6,400	4,500	3,300	2,400	1,700	1,100	690	500	330	300	250
1931-60	41,000	22,000	15,000	9,400	6,600	4,800	3,500	2,600	1,850	1,250	810	600	390	340	280

REMARKS.--Minor regulation by upstream lakes and reservoirs. Slight diversion, 10-20 cfs during summer months, into Oswego River and Hudson River basins.

01-5137.00 Choconut Creek at Vestal, N.Y.

LOCATION.--Lat 42°04'57", long 76°03'49", at bridge on State Highway 17, 0.4 mile west of Vestal, Broome County.

DRAINAGE AREA.--57.0 sq mi.

RECORDS AVAILABLE.--19 discharge measurements (1956-65).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0	0				
7	0.1	0				
30	.6	0				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							48	34	22	9.5	0.9	0.1	0		

REMARKS.--Published as "Big Choconut Creek" prior to 1962. This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5137.90 Nanticoke Creek at Union Center, N.Y.

LOCATION.--Lat 42°08'56", long 76°04'00", at bridge on County Highway 43 at Union Center, Broome County, 0.2 mile upstream from Bradley Creek.

DRAINAGE AREA.-- 89.7 sq mi.

RECORDS AVAILABLE.--9 discharge measurements (1953, 1956, 1962-65, 1968).

PEAK DISCHARGES.--9,900 cfs on October 15, 1955
8,590 cfs on October 12, 1962
13,500 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	1.5	0.7				
7	1.9	.8				
30	3.1	1.0				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							39	24	15	7.0	3.1	1.8	0.8		

01-5138.00 Nanticoke Creek at Endicott, N.Y.

LOCATION.--Lat 42°05'31", long 76°05'23", at bridge on State Highway 17C, 0.8 mile west of Endicott, Broome County.

DRAINAGE AREA.--112 sq mi.

RECORDS AVAILABLE.--16 discharge measurements (1953, 1956-62, 1964).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	2.0	0.9				
7	2.4	1.1				
30	4.0	1.3				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							49	31	19	9.5	4.0	2.3	1.0		

01-5138.29 Little Nanticoke Creek on Day Hollow Road near Owego, N.Y.

LOCATION.--Lat 42°06'11", long 76°12'15", along Day Hollow Road, 0.4 mile southwest of Bodle Hill Road, and 2.2 miles east of Owego, Tioga County.

DRAINAGE AREA.--19.7 sq mi.

RECORDS AVAILABLE.--11 discharge measurements (1966-67).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval 2	10	30	Recurrence interval 2	10	30
1	0.3	0.2	0.2	0.3	0.2	0.2
7	.35	.25	.2	.35	.2	.2
30	.4	.3	.25	.4	.25	.2

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					14	8.0	5.0	2.8	1.6	0.8	0.4	0.35	0.25		
1931-60					14	8.2	5.3	3.3	2.0	1.9	.5	.35	.25		

01-5138.30 Little Nanticoke Creek near Owego, N.Y.

LOCATION.--Lat 42°05'32", long 76°13'02", at bridge on State Highway 17C, 1 mile upstream from Barnes Creek, 1.4 miles upstream from mouth, and 1.5 miles east of Owego, Tioga County.

DRAINAGE AREA.--20.7 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.1	0				
7	.2	0				
30	.9	0				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											1.0	0.1	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5138.40 Pumpelly Creek at Owego, N.Y.

LOCATION.--Lat 42°05'21", long 76°16'02", on left bank 0.2 mile upstream from bridge on State Highway 283, 0.4 mile upstream from mouth, and 0.9 mile south of Owego, Tioga County.

DRAINAGE AREA.--8.59 sq mi.

RECORDS AVAILABLE.--July 1966 to September 1968.

PEAK DISCHARGES.--980 cfs on March 29, 1967
1,660 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.09	0.06	0.05	0.09	0.05	0.05
7	.1	.07	.06	.1	.06	.05
30	.15	.09	.07	.15	.07	.06

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					8.0	4.2	2.4	1.2	0.65	0.3	0.15	0.1	0.07		
1931-60					8.0	4.4	2.5	1.4	.75	.35	.15	.1	.07		

01-5138.62 East Branch Owego Creek tributary at Harford Mills, N.Y.

LOCATION.--Lat 42°24'58", long 76°11'37", along road 50 ft downstream from small tributary and 0.8 mile northeast of Harford Mills, Cortland County, and 0.8 mile northeast of State Highway 38.

DRAINAGE AREA.--5.77 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.08	0.05	0.04	0.08	0.05	0.04
7	.1	.06	.05	.1	.05	.04
30	.15	.07	.06	.15	.06	.05

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					9	5	3	1.7	0.8	0.35	0.15	0.09			
1931-60					9	5	3.1	1.8	.9	.4	.15	.1			

01-5140.00 Owego Creek near Owego, N.Y.

LOCATION.--Lat 42°07'40", long 76°16'17", Tioga County, on right bank 300 ft upstream from bridge on State Highway 96, 0.5 mile upstream from Catatonk Creek and 1.5 miles north of Owego.

DRAINAGE AREA.--185 sq mi.

RECORDS AVAILABLE.--January 1930 to September 1967

AVERAGE DISCHARGE.--37 years, 269 cfs

MINIMUM DAILY DISCHARGE.--8.9 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1930-67

1.1	2	5	10	25	50
3,450	5,910	9,070	11,600	15,500	18,800

10,600 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1931-59			1931-66		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	13	10	9.2	13	9.7	9.0
7	15	11	10	15	10	9.1
30	17	13	11	17	11	9.9

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-67	2,300	1,050	650	360	235	160	110	72	47	28	17	14	11.0	10.8	10
1931-60	2,500	1,050	650	370	240	165	115	80	52	31	18	14	11.3	10.8	10

01-5142.98 Sulphur Springs Creek near Spencer, N.Y.

LOCATION.--Lat 42°13'26", long 76°26'49", along Crum Town Road, 0.4 mile north of State Highway 96, and 2.5 miles east of Spencer, Tioga County.

DRAINAGE AREA.--8.64 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.08	0.04	0.03	0.07	0.04	0.03
7	.1	.05	.04	.1	.04	.03
30	.15	.07	.05	.15	.05	.04

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967						6	4.4	2.8	1.1	0.4	0.15	0.08	0.05		
1931-60						6	4.6	3.5	1.4	.5	.15	.08	.05		

01-5145.00 Dean Creek at Spencer, N.Y.

LOCATION.--Lat 42°12'10", long 76°29'50", on right bank 25 ft upstream from small tributary, 85 ft downstream from highway bridge on Spencer Road at Spencer, Tioga County.

DRAINAGE AREA.--8.03 sq mi.

RECORDS AVAILABLE.--July 1954 to September 1960

PEAK DISCHARGES.--544 cfs on October 15, 1955

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0	0				
7	0	0				
30	0	0				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							1.2	0.6	0.2	0	0	0	0		

REMARKS.--Since October 1955, high flows regulated by Pylkas Reservoir on Dean Creek (capacity, 180.7 acre-ft) and Pelto Reservoir on Burheight Creek (capacity, 53.4 acre-ft).

This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5146.63 Willseyville Creek at Willseyville, N.Y.

LOCATION.--Lat 42°17'39", long 76°22'27", at abutments of Old Delaware, Lackawanna and Western Railroad bridge, 0.3 mile northeast of Willseyville, Tioga County, and 0.5 mile north of State Highway 96B.

DRAINAGE AREA.--8.49 sq mi.

RECORDS AVAILABLE.--6 discharge measurements (1966-67).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.9	0.75	0.7	0.9	0.7	0.7
7	1.1	.8	.75	1.1	.75	.7
30	1.2	.9	.8	1.2	.8	.75

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967				16	10	8.0	5.8	4.0	2.8	1.8	1.2	1.0	0.8		
1931-60				16	10	8.2	6.0	4.4	3.1	2.0	1.3	1.0	.8		

01-5148.00 Catatonk Creek near Owego, N.Y.

LOCATION.--Lat 42°08'35", long 76°17'47", at bridge on county road, off State Highway 96, 3.3 miles northwest of Owego, Tioga County.

DRAINAGE AREA.--147 sq mi.

RECORDS AVAILABLE.--14 discharge measurements (1956-62, 1964).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	8.5	6.5				
7	9.0	7.0				
30	11	7.5				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60								72	42	18	11	9.0	7.0		

01-5148.20 Thorn Hollow Creek near Owego, N.Y.

LOCATION.--Lat 42°05'59", long 76°18'35", 0.5 mile west of junction of Thorn Hollow Road and Glen Mary Drive, 0.5 mile upstream from Lehigh Valley Railroad, 1.1 miles west of Goodrich and 2 miles west of Owego, Tioga County.
DRAINAGE AREA.--4.13 sq mi.

RECORDS AVAILABLE.--18 discharge measurements (1966-69).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.03	0.02	0.02	0.03	0.02	0.02
7	.04	.03	.02	.04	.02	.02
30	.06	.03	.03	.06	.03	.02

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					4	2.6	1.4	0.7	0.3	0.15	0.06	0.04	0.03		
1931-60					4	2.6	1.5	.8	.4	.15	.06	.04	.03		

01-5148.39 Hunts Creek near Lounsberry, N.Y.

LOCATION.--Lat 42°03'08", long 76°19'20", along Hunts Creek Road, 0.8 mile northwest of Moore Hill Road, and 0.9 mile southeast of Lounsberry, Tioga County.
DRAINAGE AREA.--6.78 sq mi.

RECORDS AVAILABLE.--7 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.05	0.03	0.02	0.05	0.02	0.02
7	.06	.04	.03	.06	.04	.02
30	.08	.05	.04	.08	.04	.03

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					4	2.4	1.5	0.8	0.5	0.2	0.08	0.05	0.03		
1931-60					4	2.5	1.6	1.0	.6	.2	.08	.05	.03		

01-5148.80 Pipe Creek at Tioga Center, N.Y.

LOCATION.-- Lat 42°03'34", long 76°20'45", at bridge on State Highway 17, at Tioga Center and 0.2 mile upstream from mouth, Tioga County.
DRAINAGE AREA.--46.5 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1962-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.05	0				
7	.1	0				
30	.3	0				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60											0.4	0.1	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5150.00 Susquehanna River near Waverly, N.Y.

LOCATION.-- Lat 41°59'05", long 76°30'05", Bradford County, Pa., on left bank 0.2 mile upstream from Cayuta Creek, 0.4 mile upstream from East Lockhart St. at Sayre, Pa., 1 mile downstream from State line, 2 miles southeast of Waverly.
DRAINAGE AREA.-- 4,773 sq mi.
RECORDS AVAILABLE.-- February 1937 to September 1967.

AVERAGE DISCHARGE.--30 years, 7,238 cfs
MINIMUM DAILY DISCHARGE.--237 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1936-67

1.1	2	5	10	25	50
42,900	66,300	87,600	101,000	117,000	129,000

128,000 cfs on March 18, 1936
121,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1937-59			1937-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	590	340	280	550	325	260
7	640	370	300	590	345	270
30	840	460	370	740	410	330

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-67	50,000	26,000	17,500	11,000	7,400	5,400	3,900	2,800	1,950	1,250	780	550	380	340	280
1931-60	50,000	26,500	18,000	11,000	7,700	5,500	4,100	3,000	2,150	1,450	870	640	420	370	300

REMARKS.--Minor regulation by upstream lakes and reservoirs. Slight diversion, 10-20 cfs during summer months, into Oswego River and Hudson River basins.

01-5155.00 Cayuta Creek near Alpine, N.Y.

LOCATION.--Lat 42°00'49", long 76°43'58", near right bank on upstream side of highway bridge at outlet of Cayuta Lake and 2 1/2 miles north of Alpine, Schuyler County.

DRAINAGE AREA.--17.6 sq mi.

RECORDS AVAILABLE.--Daily discharges December 1929 to September 1931.

PEAK DISCHARGES.--185 cfs on June 19, 1930

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	Trace	0				
7	0.1	0				
30	.3	0				

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							11	7.5	4.9	2.3	0.4	0.1	0		

(Discharge, in cfs, which was equaled or exceeded for indicated percentage of time)

REMARKS.--Natural regulation by Cayuta Lake. Because of short period of record, duration and frequency curves were developed by correlation methods using monthly mean discharges for period of record.

01-5155.80 Carter Creek near Cayuta, N.Y.

LOCATION.--Lat 42°19'43", long 76°39'42", along Carter Creek Road, 0.4 mile north of State Highway 13, 0.6 mile upstream from mouth, and 3.5 miles northeast of Cayuta, Schuyler County.

DRAINAGE AREA.--4.76 sq mi.

RECORDS AVAILABLE.--13 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.04	0.02	0.015	0.04	0.02	0.015
7	.06	.025	.02	.06	.02	.015
30	.08	.04	.03	.08	.025	.02

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					5.7	3.9	2.7	1.3	0.6	0.2	0.06	0.05	0.025		
1931-60					5.8	4.0	2.8	1.7	.7	.25	.07	.05	.025		

(Discharge, in cfs, which was equaled or exceeded for indicated percentage of time)

01-5158.50 Langford Creek at Van Etten, N.Y.

LOCATION.--Lat 42°12'12", long 76°33'15", 100 ft downstream from bridge on Langford Creek Road, 700 ft north of State Highway 224 and 0.2 mile north of Van Etten, Chemung County.

DRAINAGE AREA.--5.26 sq mi.

RECORDS AVAILABLE.--8 discharge measurements (1967-68).

PEAK DISCHARGES.--1,080 cfs on July 8, 1958

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.015	Trace	Trace	0.01	Trace	Trace
7	.02	0.01	Trace	.015	Trace	Trace
30	.025	.01	0.01	.02	0.01	Trace

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967						5.4	2.1	0.7	0.25	0.08	0.025	0.015	0.01		
1931-60						5.8	2.4	1.0	.35	.1	.03	.015	.01		

(Discharge, in cfs, which was equaled or exceeded for indicated percentage of time)

01-5160.00 Cayuta Creek at Waverly, N.Y.

LOCATION.--Lat 42°00'32", long 76°31'33", at bridge on Ithaca Street, Waverly, Tioga County.

DRAINAGE AREA.--140 sq mi

RECORDS AVAILABLE.--263 discharge measurements (1938-69). a/

PEAK DISCHARGES.--3,370 cfs on August 14, 1942
1,300 cfs on May 28, 1952

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	6.5	3.0				
7	7.5	3.5				
30	9.0	4.5				

DURATION OF DAILY DISCHARGE

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							75	51	32	16	8.5	6.2	4.0		

(Discharge, in cfs, which was equaled or exceeded for indicated percentage of time)

REMARKS.--a/ Also intermittent record of stage and discharge measurements 1898-1902.

01-5205.00 Tioga River at Lindley, N.Y.

LOCATION.--Lat 42°01'44", long 77°07'57", Steuben County, on left bank just downstream from bridge on County Highway 120 at Lindley, and 6 miles upstream from Canisteo River.

DRAINAGE AREA.--771 sq mi.

RECORDS AVAILABLE.--January 1930 to September 1967.

AVERAGE DISCHARGE.--37 years, 770 cfs

MINIMUM DAILY DISCHARGE.--7.2 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1930-67

1.1	2	5	10	25	50
10,300	21,800	34,800	44,000	56,300	65,700

128,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1930-59			1930-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	33	13	8.6	28	12	8.4
7	39	15	9.7	32	14	9.7
30	52	19	12	43	18	12

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-67	7,200	3,000	1,900	1,000	620	400	260	175	115	74	44	30	17	14	9.8
1931-60	7,500	3,300	2,050	1,050	670	430	290	195	130	84	50	37	20	16	11

01-5205.20 North Branch Glendenning Creek at Presho, N.Y.

LOCATION.--Lat 42°04'50", long 77°10'05", along Creek Road, 0.3 mile upstream from South Branch, 1.0 mile west of U.S. Highway 15 and Presho, Steuben County.

DRAINAGE AREA.--9.27 sq mi.

RECORDS AVAILABLE.--13 discharge measurements (1966-67).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.1	0.03	0.02	0.09	0.02	0.015
7	.15	.035	.03	.1	.03	.02
30	.15	.04	.035	.15	.04	.03

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					3	2	1.2	0.65	0.35	0.25	0.15	0.1	0.04		
1931-60					3	2	1.2	.75	.45	.25	.15	.1	.04		

01-5209.90 Canisteo River at Bishopville, N.Y.

LOCATION.--Lat 42°21'56", long 77°46'01", 500 ft downstream from bridge on Thomas Hill Road, and 0.7 mile west of Bishopville, Allegheny County.

DRAINAGE AREA.--21.6 sq mi.

RECORDS AVAILABLE.--12 discharge measurements (1966-67).

PEAK DISCHARGES.--3,400 cfs on June 23, 1972 at station 01-5209.91, 0.7 mile downstream at bridge on Bailey Hill Road, drainage area 22.4 sq mi.

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.25	0.09	0.08	0.2	0.1	0.08
7	.35	.13	.1	.25	.13	.1
30	.4	.15	.13	.35	.15	.13

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					17	9.5	4.8	2.5	1.2	0.7	0.45	0.3	0.2		
1931-60					18	9.5	4.8	2.6	1.4	.8	.45	.35	.2		

01-5215.00 Canisteo River at Arkport, N.Y.

LOCATION.--Lat 42°23'45", long 77°42'42", Steuben County, on left bank 0.2 mile downstream from Arkport Dam and 0.9 mile west of Arkport.

DRAINAGE AREA.--30.6 sq mi.

RECORDS AVAILABLE.--January 1937 to September 1967.

AVERAGE DISCHARGE.--30 years, 33.2 cfs

MINIMUM DAILY DISCHARGE.--0.4 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1935-67

1.1	2	5	10	25	50

1,080 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1937-59			1937-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.0	0.45	0.4	0.9	0.5	0.4
7	1.2	.6	.5	1.0	.6	.5
30	1.4	.7	.6	1.2	.7	.6

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-67	430	145	75	36	23	15	9.2	5.6	3.3	2.2	1.5	1.1	0.76	0.68	0.56
1931-60	440	145	80	40	24	15	9.2	5.8	3.6	2.4	1.5	1.2	.8	.7	.6

REMARKS.--Since November 1939, flows above 500 cfs controlled by detention in Arkport Reservoir.

01-5216.10 Big Creek near North Hornell, N.Y.

LOCATION.--Lat 42°22'05", long 77°38'39", at bridge on State Highway 70, 1.5 miles northeast of North Hornell, Steuben County, and 2.5 miles southeast of Arkport.

DRAINAGE AREA.--16.8 sq mi.

RECORDS AVAILABLE.--14 discharge measurements (1966-68).

PEAK DISCHARGES.--11,900 cfs on July 9, 1935
6,680 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.6	0.2	0.2	0.55	0.2	0.2
7	.7	.3	.25	.6	.25	.25
30	.9	.35	.25	.85	.35	.25

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					14	9.5	5.8	3.5	2.2	1.4	0.9	0.65	0.4		
1931-60					14	9.5	5.9	3.6	2.3	1.5	.9	.7	.45		

01-5220.00 Canisteo River at Hornell, N.Y.

LOCATION.--Lat 42°20'20", long 77°39'40", on right bank 30 ft upstream from Seneca Street Bridge in Hornell, Steuben County, 4,000 ft upstream from Canacadea Creek, and 1 1/2 miles downstream from Big Creek.

DRAINAGE AREA.--95.0 sq mi.

RECORDS AVAILABLE.--July 1938 to March 1943.

PEAK DISCHARGES.--3,230 cfs on February 20, 1939

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	6.5	4.5				
7	7	5.5				
30	8	6				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							35	25	15	11	8	7	6		

REMARKS.--City of Hornell diverts an average of about 3.5 cfs for municipal supply from Carrington Creek, a tributary above station; sewage enters river below gage. Since November 1939, flood flows partly regulated by Arkport Reservoir (capacity, 7,936 acre-ft); normal regulation generally insufficient to materially affect figures of monthly runoff.

01-5223.00 Canacadea Creek near Almond, N.Y.

LOCATION.--Lat 42°17'19", long 77°44'52", at bridge on county road off State Highway 21, 2.1 miles southwest of Almond, Allegany County.

DRAINAGE AREA.--17.1 sq mi.

RECORDS AVAILABLE.--14 discharge measurements (1956-60, 1962, 1965).

PEAK DISCHARGES.--18,000 cfs on July 9, 1935

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	1.0	0.6				
7	1.2	.7				
30	1.5	.8				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							6.1	4.3	3.1	2.3	1.6	1.3	0.9		

01-5225.00 Karr Valley Creek at Almond, N.Y.

LOCATION.-- Lat 42°18'41", long 77°45'05", Allegany County, on right bank 500 ft downstream from McHenry Valley Creek, 0.7 mile upstream from mouth, and 1 mile southwest of Almond.

DRAINAGE AREA.--27.4 sq mi.

RECORDS AVAILABLE.-- February 1937 to September 1967.

AVERAGE DISCHARGE.--30 years, 29.6 cfs

MINIMUM DAILY DISCHARGE.--0 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1937-67

1.1	2	5	10	25	50
1,130	2,740	4,230	5,090	6,020	6,610

10,900 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1937-59			1937-66		
Consecutive	Recurrence interval			Recurrence interval		
days	2	10	30	2	10	30
1	0.5	0.1	0	0.5	0.08	0
7	.6	.2	0.1	.55	.1	0.02
30	.9	.2	.1	.77	.2	.09

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-67	340	111	66	34	19	12	7.4	4.3	2.4	1.5	0.90	0.60	0.25	0.17	0.14
1931-60	380	135	74	34	19	12	7.2	4.4	2.6	1.6	.92	.61	.30	.24	.17

REMARKS.--This site is an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5235.00 Canacadea Creek near Hornell, N.Y.

LOCATION.--Lat 42°20'05", long 77°41'00", Steuben County, on right bank 35 ft downstream from bridge on State Highway 21, 1.2 miles west of Hornell, 1.5 miles downstream from Almond Dam, and 2 miles upstream from mouth.

DRAINAGE AREA.--57.9 sq mi.

AVERAGE DISCHARGE.--25 years, 60.9 cfs

RECORDS AVAILABLE.--October 1940 to December 1942, October 1944 to September 1967; see remarks.

MINIMUM DAILY DISCHARGE.--0.6 cfs, *2.8 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1949-67

1.1	2	5	10	25	50
1,060	1,900	2,640	3,080	3,590	3,930

5,880 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1941, 1945-59			1941, 1945-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	6.6	4.2	3.5	6.5	4.1	3.3
7	7.4	4.6	3.8	7.0	4.2	3.4
30	8.6	5.5	4.6	7.9	5.3	4.5

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1941-42, 1945-67	660	230	132	68	44	30	22	17	13	10	7.4	6.3	4.6	3.9	2.2
1931-60	720	240	140	73	44	30	22	17	13	10	7.8	6.5	5.0	4.6	4.1

REMARKS.--Since October 1948, flood flows regulated by detention in Almond Reservoir. Occasional regulation at low flows to clean debris from reservoir gates. Ten days of extreme low flow caused by regulation in 1965 and 1966 water years influence 99.9 percent flow duration but were disregarded in calculating low flow frequency. Asterisk (*) indicates 2d lowest mean discharge. Records also available October 1924 to September 1929, June 1938 to October 1940, and August 1942 to September 1944 at sites 1.1 to 1.5 miles downstream (station 01-5240.00); considered equivalent to this station but not used in compiling statistics listed here.

01-5245.00 Canisteo River below Canacadea Creek, at Hornell, N.Y.

LOCATION.--Lat 42°18'50", long 77°39'05", Steuben County, on right bank 235 ft upstream from Erie Railroad bridge in Hornell, 0.25 mile upstream from Crosby Creek, and 1.5 miles downstream from Canacadea Creek.

DRAINAGE AREA.--158 sq mi.

AVERAGE DISCHARGE.--25 years, 151 cfs

RECORDS AVAILABLE.--August 1942 to September 1967.

MINIMUM DAILY DISCHARGE.--9.0 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1943-67

1.1	2	5	10	25	50
2,230	3,900	5,690	6,950	8,630	9,950

9,560 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1943-59			1943-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	17	10	8.1	15	10	8.1
7	19	12	9.3	16	11	9.7
30	21	14	12	19	13	11

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1943-67	1,520	580	340	180	118	82	58	41	31	25	19	16	13	12	11
1931-60	1,550	610	360	190	125	91	67	46	34	27	20	17	13	12	10

REMARKS.--City of Hornell diverts an average of about 3.5 cfs for municipal supply from Carrington Creek, a tributary above station; sewage enters river below gage. Since November 1939, flood flows regulated by Arkport Reservoir, and since October 1948, by Almond Reservoir; normal regulation insufficient to materially affect figures of monthly runoff.

01-5245.50 Cunningham Creek near Canisteo, N.Y.

LOCATION.--Lat 42°17'39", long 77°36'45", along Creek Road, 0.5 mile northeast of Erie Railroad and 1.7 miles north of Canisteo, Steuben County.

DRAINAGE AREA.--5.34 sq mi.

RECORDS AVAILABLE.--15 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.04	0.005	Trace	0.035	0.005	Trace
7	.06	.01	0.005	.04	.007	0.003
30	.09	.015	.007	.07	.01	.006

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					4.3	2.7	1.7	1.0	0.5	0.2	0.09	0.05	0.02		
1931-60					4.4	2.8	1.8	1.1	.6	.25	.095	.055	.02		

01-5250.00 Bennett Creek at Canisteo, N.Y.

LOCATION.--Lat 42°15'55", long 77°35'45", on left bank 400 ft upstream from Canisteo-Jasper highway bridge, a quarter of a mile east of Canisteo, Steuben County, and half a mile upstream from mouth.

DRAINAGE AREA.-- 95.8 sq mi.

RECORDS AVAILABLE.--June 1938 to September 1947; 11 discharge measurements (1957-62).

PEAK DISCHARGES.-- 12,400 cfs on July 9, 1935
19,500 cfs on June 22, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.8	0				
7	2.4	0				
30	2.9	0.1				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							35	25	15	8	4	2	0.1		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5255.00 Canisteo River at West Cameron, N.Y.

LOCATION.-- Lat 42°13'20", long 77°25'06", Steuben County, on right bank 250 ft downstream from bridge on County Highway 119, 0.3 mile southeast of West Cameron, and 1.7 miles north of Cameron.

DRAINAGE AREA.--340 sq mi.

RECORDS AVAILABLE.-- January 1930 to September 1931, February 1937 to September 1967.

AVERAGE DISCHARGE.--31 years, 339 cfs

MINIMUM DAILY DISCHARGE.--12 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1937-67

1.1	2	5	10	25	50
4,820	9,480	13,100	15,100	17,000	18,200

43,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1937-59			1937-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	25	15	12	24	16	13
7	28	17	14	26	17	14
30	34	19	16	30	19	16

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931, 1938-67	3,300	1,340	780	420	260	175	116	78	56	42	30	25	19	18	15
1931-60	3,600	1,450	840	410	245	165	115	85	62	45	33	26	19	17	15

REMARKS.--Flood flows regulated by Arkport Reservoir since November 1939 and Almond Reservoir since October 1948; normal regulation insufficient to materially affect figures of monthly runoff.

01-5257.50 Tuscarora Creek Tributary near Woodhull, N.Y.

LOCATION.--Lat 42°06'12", long 77°26'21", on left bank 1,900 ft north of State Highway 17, 0.9 mile upstream from mouth, and 2.5 miles northwest of Woodhull, Steuben County.

DRAINAGE AREA.--9.43 sq mi.

RECORDS AVAILABLE.--July 1966 to September 1968.

PEAK DISCHARGES.--686 cfs on March 12, 1967
2,360 cfs on May 30, 1968
1,440 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.05	0.001		0.04	0	
7	.08	.002		.06	0.002	
30	.13	.01		.1	.007	

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					5.0	3.0	1.7	0.95	0.45	0.2	0.1	0.04	0.005		
1931-60					5.5	3.2	1.8	1.0	.55	.3	.15	.06	.01		

01-5258.00 South Branch Tuscarora Creek Tributary near Woodhull, N.Y.

LOCATION.--Lat 42°04'44", long 77°26'16", 0.9 mile upstream from mouth and 1.5 miles west of Woodhull, Steuben County.

DRAINAGE AREA.--7.4 sq mi.

RECORDS AVAILABLE.--10 discharge measurements (1967-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.01			0.006		
7	.015			.01		
30	.035			.02		

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					3.5	2	1	0.5	0.2	0.07	0.02	0.006			
1931-60					3.5	2	1	.55	.25	.10	.03	.01			

01-5260.00 Tuscarora Creek near South Addison, N.Y.

LOCATION.--Lat 42°04'00", long 77°17'02", Steuben County, on left bank 0.9 mile downstream from Elk Creek, 1.3 miles southwest of South Addison, and 3.4 miles southwest of Addison.

DRAINAGE AREA.-- 114 sq mi.

RECORDS AVAILABLE.-- February 1937 to September 1967.

AVERAGE DISCHARGE.--30 years, 94.7 cfs

MINIMUM DAILY DISCHARGE.--0 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1937-67

1.1	2	5	10	25	50
2,419	6,424	10,182	12,311	14,560	15,946

18,700 cfs on June 22, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1938-59			1938-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.5	0	0	0.3	0	0
7	.7	0	0	.4	0	0
30	1.4	Trace	0	.8	0	0

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-67	1,200	420	220	100	58	34	20	11	5.0	2.5	0.9	0.3	0	0	0
1931-60	1,250	450	240	110	60	35	20	12	6.6	3.3	1.2	.5	0	0	0

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5264.95 Mulholland Creek near Erwins, N.Y.

LOCATION.--Lat 42°07'00", long 77°07'21", on right bank 1,500 ft upstream from N.Y. Central Railroad bridge, 0.5 mile upstream from mouth, and 1.2 miles east of Erwins, Steuben County.

DRAINAGE AREA.--5.06 sq mi.

RECORDS AVAILABLE.--July 1966 to September 1968.

PEAK DISCHARGES.--96 cfs on November 28, 1966
590 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.03	0.01	Trace	0.03	Trace	Trace
7	.05	.015	0.01	.05	0.01	Trace
30	.06	.02	.015	.06	.015	0.01

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					4	2.2	1.4	0.6	0.3	0.15	0.07	0.04	0.015		
1931-60					4.5	2.5	1.5	.7	.35	.15	.07	.04	.015		

01-5265.00 Tioga River near Erwins, N.Y.

LOCATION.-- Lat 42°07'15", long 77°07'45", Steuben County, on right bank 20 ft downstream from bridge on Mulholland Road, 1.1 miles northeast of Erwins, and 1.1 miles downstream from Canisteo River.

DRAINAGE AREA.-- 1,377 sq mi.

RECORDS AVAILABLE.-- July 1918 to September 1967.

AVERAGE DISCHARGE.--49 years, 1,327 cfs

MINIMUM DAILY DISCHARGE.--20 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1919-67

1.1	2	5	10	25	50
18,200	33,400	48,400	58,400	70,800	80,100

190,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1919-59			1919-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	62	32	24	58	33	24
7	69	35	27	65	36	27
30	96	46	33	89	45	33

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1919-67	12,500	5,200	3,100	1,700	1,040	680	460	310	210	145	90	65	42	37	29
1931-60	13,500	5,600	3,400	1,850	1,100	720	490	340	230	150	90	66	45	40	28

REMARKS.--Flood flows slightly regulated by Arkport Reservoir since November 1939 and Almond Reservoir since October 1948.

01-5269.80 Kirkwood Creek near Atlanta, N.Y.

LOCATION.--Lat 42°31'55", long 77°27'45", on left bank at downstream side of bridge, 250 ft from road junction, 1,300 ft upstream from State Highway 371, and 2 miles southeast of Atlanta, Steuben County.

DRAINAGE AREA.--4.64 sq mi.

RECORDS AVAILABLE.--August 1966 to September 1968.

PEAK DISCHARGES.--76 cfs on March 22, 1968
810 cfs on June 23, 1972 at upstream site with drainage area of 3.70 sq mi (station 01-5269.76, lat 42°32'11", long 77°26'31")

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.15	0.06	0.04	0.15	0.05	0.03
7	.2	.07	.06	.2	.06	.04
30	.25	.1	.08	.2	.1	.07

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					5	3	2	1.3	0.7	0.4	0.25	0.15	0.09		
1931-60					5.5	3.5	2.5	1.6	.85	.5	.3	.2	.1		

01-5270.00 Cohocton River at Cohocton, N.Y.

LOCATION.-- Lat 42°30'00", long 77°30'02", Steuben County, on left bank 450 ft downstream from bridge on U.S. Highway 15 at Cohocton, 800 ft downstream from small tributary, and 1.4 miles upstream from Reynolds Creek.
DRAINAGE AREA.-- 52.2 sq mi.
RECORDS AVAILABLE.-- October 1950 to September 1967.
AVERAGE DISCHARGE.-- 17 years, 51.3 cfs
MINIMUM DAILY DISCHARGE.-- 1.8 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1951-67

1.1	2	5	10	25	50
237	416	614	757	951	1,105

2,260 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1951-59			1951-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	4.9	2.6		4.6	2.4	1.8
7	5.7	3.0		5.1	2.7	2.0
30	6.7	3.9		6.0	3.7	3.0

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1951-67	330	180	128	80	54	37	25	18	13	9.3	6.6	5.3	3.6	3.1	2.2
1931-60	350	185	130	84	59	42	30	21	15	11	7.4	5.8	4.0	3.3	2.3

REMARKS.--Slightly regulated by small dam upstream.

01-5274.50 Castle Creek near Wallace, N.Y.

LOCATION.--Lat 42°25'15", long 77°28'10", along road 0.2 mile upstream from mouth, 0.4 mile south of junction between Neil and Stever Roads, and 1.5 miles southwest of Wallace, Steuben County.
DRAINAGE AREA.--9.23 sq mi.

RECORDS AVAILABLE.--13 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	2.8	2.1	1.5	3.0	2.0	1.8
7	3.0	2.2	1.6	3.1	2.1	1.8
30	3.5	2.5	2.4	3.4	2.5	2.3

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					9.4	7.8	6.4	5.4	4.6	3.9	3.3	2.9	2.4		
1931-60					10.0	8.4	7.0	5.9	5.0	4.2	3.5	3.1	2.6		

01-5275.00 Cohocton River at Avoca, N.Y.

LOCATION.--Lat 42°23'50", long 77°25'10", on left bank 15 ft downstream from highway bridge, 0.75 mile south of Avoca, Steuben County, and 4,200 ft upstream from Salmond and Goff Creeks.
DRAINAGE AREA.--157 sq mi.

RECORDS AVAILABLE.--June 1938 to September 1945.

PEAK DISCHARGES.--3,880 cfs on March 17, 1942
13,300 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	1931-59					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	20	13				
7	22	14				
30	27	17				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60	1,400	700	450	240	160	110	85	63	46	34	24	20	14	12	10

REMARKS.--Diurnal fluctuation at low and medium flow caused by gravel plant above station.

01-5276.00 Goff Creek near Howard, N.Y.

LOCATION.-- Lat 42°21'46", long 77°27'34", at bridge on State Highway 70 at junction of Hamilton Road, and 2.6 miles east of Howard, Steuben County.
DRAINAGE AREA.--17.9 sq mi.

RECORDS AVAILABLE.--12 discharge measurements (1967).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	2.5	1.4	1.2	2.2	1.4	1.1
7	2.7	1.7	1.3	2.4	1.6	1.3
30	3.0	2.0	1.7	2.8	1.9	1.5

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967				22	16	12	9.0	6.5	4.7	3.7	2.7	2.3	1.9		
1931-60				24	17	13	9.5	6.9	5.1	4.0	3.0	2.5	1.9		

Appendix A.--Statistical summary of streamflow (Continued)

01-5280.00 Fivemile Creek near Kanona, N.Y.

LOCATION.-- Lat 42°23'18", long 77°21'29", Steuben County, on left bank just downstream from town of Wheeler highway bridge, 1.3 miles upstream from mouth and Kanona.

DRAINAGE AREA.-- 66.8 sq mi.

RECORDS AVAILABLE.-- February 1937 to September 1967.

AVERAGE DISCHARGE.-- 30 years, 69.8 cfs

MINIMUM DAILY DISCHARGE.--0.1 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1937-67

1.1	2	5	10	25	50
904	1,501	2,040	2,376	2,779	3,065

5,110 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1937-59			1937-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.6	0.6	0.4	1.5	0.45	0.2
7	1.9	.7	.5	1.8	.65	.3
30	2.3	1.0	.8	2.0	.9	.6

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1938-67	725	290	170	84	50	32	21	12	6.0	3.5	2.1	1.5	0.9	0.7	0.3
1931-60	740	305	180	95	57	35	22	12	6.6	3.9	2.3	1.7	1.0	.7	.2

01-5282.00 Campbell Creek near Kanona, N.Y.

LOCATION.--Lat 42°20'48", long 77°23'54", at bridge, 2.4 miles southwest of Kanona, Steuben County.

DRAINAGE AREA.--32.8 sq mi.

RECORDS AVAILABLE.--17 discharge measurements (1935, 1953, 1957-62, 1965).

PEAK DISCHARGES.--14,000 cfs on July 8, 1935
7,340 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.4	0.1				
7	.5	.1				
30	.6	.2				

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							8.8	5.5	3.0	1.4	0.6	0.4	0.2		

01-5290.00 Mud Creek near Savona, N.Y.

LOCATION.-- Lat 42°18'30", long 77°11'50", Steuben County, on left bank just upstream from small tributary entering from east, 2.4 miles upstream from Savona and 3.3 miles upstream from mouth.

DRAINAGE AREA.--76.6 sq mi.

RECORDS AVAILABLE.--July 1918 to December 1919 (published as "at Savona"), March 1937 to September 1967.

AVERAGE DISCHARGE.--30 years, 40.4 cfs

MINIMUM DAILY DISCHARGE.--0.1 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1919, 1937-67

1.1	2	5	10	25	50
368	889	1,286	1,476	1,648	1,740

6,110 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1937-59			1937-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.5	0.5	0.3	1.6	0.47	0.2
7	1.8	.6	.4	1.8	.54	.3
30	2.3	.9	.6	2.1	.94	.6

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1937-67	520	180	86	40	24	15	10	6.6	4.5	3.1	2.2	1.7	0.9	0.7	0.3
1931-60	550	200	98	43	24	15	10	6.9	4.8	3.3	2.1	1.5	.9	.7	.3

REMARKS.--Flow regulated by Lake Lamoka. During each year, a large part of flow from 45 sq mi of drainage area is diverted into Keuka Lake (Oswego River basin) for power development. Monthly records of the diversion for January 1951 to September 1966 available in files of U.S. Geological Survey.

01-5295.00 Cohocton River near Campbell, N.Y.

LOCATION.-- Lat 42°15'10", long 77°13'00", Steuben County, on left bank just downstream from bridge on town road at junction with County Highway 125, 1.9 miles upstream from Michigan Creek and 2 miles north of Campbell.

DRAINAGE AREA.--470 sq mi.

RECORDS AVAILABLE.-- July 1918 to September 1967.

AVERAGE DISCHARGE.--49 years, 436 cfs

MINIMUM DAILY DISCHARGE.--8.0 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1919-67

1.1	2	5	10	25	50
3,940	7,550	11,100	13,300	16,100	18,100

32,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1919-59			1919-67		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	34	19	10	34	18	11
7	39	22	13	38	21	14
30	46	27	18	46	26	18

DURATION OF DAILY DISCHARGE

Discharge, in cfs, which was equaled or exceeded for indicated percentage of time

Period on which data are based	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1919-67	3,800	1,650	1,100	590	370	250	178	128	92	66	46	36	25	21	16
1931-60	3,800	1,750	1,100	610	390	265	180	130	93	67	46	36	23	20	13

REMARKS.--During each year a large part of flow from 45 sq mi of drainage area above Lake Lamoka Outlet on Mud Creek, a tributary above this station, is diverted into Keuka Lake (Oswego River basin), for power development.

01-5295.50 Michigan Creek at Campbell, N.Y.

LOCATION.--Lat 42°13'50", long 77°12'23", at bridge on State Highway 333, 0.2 mile upstream from mouth, 0.6 mile west of Campbell, Steuben County.

DRAINAGE AREA.--22.7 sq mi.

RECORDS AVAILABLE.--13 discharge measurements (1956-62, 1965).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.3	0				
7	.4	0				
30	.6	0.1				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							8.0	5.0	2.9	1.4	0.6	0.3	0.1		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

01-5298.00 Meads Creek at Coopers Plains, N.Y.

LOCATION.--Lat 42°11'35", long 77°08'31", at bridge on Meads Creek Road, off U.S. Highway 15, 0.8 mile north of Coopers Plains, Steuben County.

DRAINAGE AREA.--68.5 sq mi

RECORDS AVAILABLE.--16 discharge measurements (1953, 1956-62, 1965).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.2	0.5				
7	1.5	.5				
30	2.0	.7				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							21	13	7.5	3.7	1.8	1.2	0.7		

01-5302.00 Post Creek at Corning, N.Y.

LOCATION.-- Lat 42°10'10", long 77°02'50", at foot bridge at N.Y.C.R.R. warehouse, 0.6 mile northeast of Corning, Steuben County.

DRAINAGE AREA.--31.9 sq mi.

RECORDS AVAILABLE.--15 discharge measurements (1956-62, 1965).

PEAK DISCHARGES.--3,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.4	0.1				
7	.5	.2				
30	.7	.2				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							10	6.5	3.2	1.3	0.6	0.4	0.2		

01-5302.40 Gillette Creek near South Corning, N.Y.

LOCATION.--Lat 42°06'35", long 77°00'04", 0.6 mile south of Chemung River along Brown Hollow Road, and 1.7 miles east of South Corning, Steuben County.

DRAINAGE AREA.--3.77 sq mi.

RECORDS AVAILABLE.--9 discharge measurements (1966-68).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.009	0.003	Trace	0.009	Trace	Trace
7	.015	.005	0.003	.015	0.003	Trace
30	.02	.009	.005	.02	.005	0.003

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					2.1	1.0	0.6	0.2	0.09	0.04	0.02	0.01	0.005		
1931-60					2.4	1.2	.6	.25	.1	.04	.02	.01	.005		

01-5303.00 Singsing Creek near Elmira, N.Y.

LOCATION.--Lat 42°08'29", long 76°54'26", at bridge on State Highway 17, 1.3 miles east of Big Flats, 4.1 miles northwest of Elmira, Chemung County.

DRAINAGE AREA.--21.3 sq mi.

RECORDS AVAILABLE.--16 discharge measurements (1956-62, 1965-66).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	1.5	0.1				
7	2.0	.2				
30	2.6	.7				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							11	8.8	6.2	4.6	2.8	1.7	0.5		

01-5304.50 Latta Brook at Horseheads, N.Y.

LOCATION.--Lat 42°08'53", long 76°47'38", along Latta Brook Road, just west of Burns Road, 0.6 mile east of State Highways 14 & 17, and 0.8 mile east of Horseheads, Chemung County.

DRAINAGE AREA.--5.26 sq mi.

RECORDS AVAILABLE.--15 discharge measurements (1966-67).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959			Through 1966		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.04	0.01	Trace	0.03	Trace	Trace
7	.05	.015	0.01	.04	0.01	Trace
30	.06	.02	.01	.05	.015	Trace

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
Through 1967					2.0	1.0	0.6	0.3	0.2	0.1	0.04	0.025	0.01		
1931-60					2.2	1.1	.6	.35	.2	.1	.05	.03	.015		

01-5305.00 Newtown Creek at Elmira, N.Y.

LOCATION.--Lat 42°06'11", long 76°47'54", Chemung County, on left bank 200 ft downstream from Linden Place Bridge in Elmira, and 1.5 miles upstream from mouth.

DRAINAGE AREA.--77.5 sq mi.

RECORDS AVAILABLE.--May 1938 to September 1967.

AVERAGE DISCHARGE.--29 years, 85.6 cfs

MINIMUM DAILY DISCHARGE.--5.0 cfs

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1938-67

1.1	2	5	10	25	50
1,363	2,377	2,985	3,243	3,463	3,574

About 4,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1939-59			1939-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	13	7.2	6.0	11	6.4	5.0
7	14	8.0	6.6	12	7.4	6.0
30	15	9.0	7.4	13	8.0	6.5

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1939-67	780	300	190	110	70	50	38	28	22	17	12	9.6	7.2	6.6	5.8
1931-60	800	300	185	105	73	52	38	29	22	18	13	11.0	8.1	7.4	6.0

01-5308.00 Seeley Creek near Elmira, N.Y.

LOCATION.--Lat 42°03'03", long 76°46'32", at bridge on State Highway 427, 1.6 miles upstream from mouth, and 1.7 miles south of Elmira, Chemung County.

DRAINAGE AREA.--144 sq mi.

RECORDS AVAILABLE.--17 discharge measurements (1950, 1956-62, 1964-65).

PEAK DISCHARGES.--

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.6	0.1				
7	.8	.2				
30	1.2	.3				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time: 1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							30	16	7.6	3.5	1.3	0.8	0.3		

01-5310.00 Chemung River at Chemung, N.Y.

LOCATION.--Lat 42°00'08", long 76°38'06", Chemung County, on right bank 100 ft upstream from bridge on State Highway 427, 0.7 mile southwest of Chemung, and 10 miles upstream from mouth.

DRAINAGE AREA.--2,506 sq mi.

AVERAGE DISCHARGE.--61 years, 2,457 cfs

RECORDS AVAILABLE.--September 1903 to September 1967 (gage heights only for some winter periods).

MINIMUM DAILY DISCHARGE.--72 cfs a/

ANNUAL PEAK DISCHARGE, in cfs, for indicated recurrence interval, in years, based on records for 1904-67

1.1	2	5	10	25	50
26,200	48,000	67,500	79,500	98,000	103,000

189,000 cfs on June 23, 1972

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, based on records for period indicated

Period of record:	1915-59			1915-66		
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	160	84	71	150	88	71
7	180	92	77	170	95	78
30	210	110	90	210	110	90

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1916-67	22,000	9,600	5,800	3,200	2,000	1,350	940	660	475	325	205	155	110	97	83
1931-60	23,500	9,900	6,100	3,300	2,100	1,450	980	680	470	315	205	155	110	97	80

REMARKS.--High flows slightly regulated by upstream reservoirs. During each year a large part of flow from 45 sq mi is diverted from Mud Creek, an upstream tributary, into Keuka Lake (Oswego River basin), for power development. a/ Based on climatic years 1915-66.

01-5312.00 Wynkoop Creek at Chemung, N.Y.

LOCATION.--Lat 42°00'24", long 76°36'13", at bridge on State Highway 17, 0.5 mile east of Chemung, Chemung County, and 0.8 mile upstream from mouth.

DRAINAGE AREA.--33.9 sq mi.

RECORDS AVAILABLE.--17 discharge measurements (1956-62, 1964-65).

PEAK DISCHARGES.--3,000 cfs on October 16, 1955

ANNUAL LOWEST MEAN DISCHARGE, in cfs, for indicated number of consecutive days and indicated recurrence interval, in years, for periods of record based on records at index stations

Period of record:	Through 1959					
Consecutive days	Recurrence interval			Recurrence interval		
	2	10	30	2	10	30
1	0.1	0				
7	.1	0				
30	.3	Trace				

DURATION OF DAILY DISCHARGE

Period on which data are based	Discharge, in cfs, which was equaled or exceeded for indicated percentage of time														
	1	5	10	20	30	40	50	60	70	80	90	95	99	99.5	99.9
1931-60							12	7.2	4.0	1.5	0.2	0.1	0		

REMARKS.--This site is in an underflow zone; therefore, the low flow data can not be used to estimate flow at sites upstream or downstream from the measuring site.

Appendix B.--Physiographic characteristics of basins

Explanation of table headings

USGS station number: Refer to Appendix A for identification of station.

Area of drainage basin: Measured by planimeter on topographic maps.

Percentage area sand and gravel: For most stations, including all stations where basin area is less than 200 square miles, area of sand and gravel (as interpreted from topographic maps, soils maps, and sparse field data) measured by planimeter on topographic maps and divided by basin area. For most stations where basin area is larger than 200 square miles, estimated from visual examination of maps in comparison with measured subbasins. All percentages are expressed as decimals in this table; that is, 5.2 percent is expressed as .052.

Mean runoff: For long-term gaging stations, measured and adjusted to 1931-60 standard period. For other stations, estimated from figure 11.

Mean annual precipitation: Estimated from figure 3.

Valley length: 90 percent of the distance from measurement site to drainage divide measured on topographic maps along the axis of the valley occupied by the principal stream.

Sinuosity: Stream length divided by valley length. (Stream length is measured along the actual channel shown on the topographic maps over the same valley reach taken to represent valley length.)

Valley slope: Change in valley-bottom altitude over same valley reach, divided by valley length.

$(\text{Length})^2$ divided by Area: Stream length squared divided by basin area.

Solar energy factor: Cosine of basin azimuth (taken in an upstream direction along the principal stream) times valley slope plus 0.675 to represent average angle of incident solar radiation at the latitude of the basin.

Appendix B.--Physiographic characteristics of basins (Continued)

USGS station number	Area of drainage basin (sq mi)	Percentage area of sand and gravel (decimal)	Mean runoff (cfsm)	Mean annual precipitation (inches)	Valley length (feet)	Sinuosity	Valley slope	(Length)^2 divided by Area	Solar energy factor
01-4965.00	102	0.162	1.70	39.0	49,103	1.23	0.0015	1.27	0.6764
01-4967.80	1.60	.012	1.63	40.0	8,500	1.07	.0471	1.87	.7077
01-4969.20	5.45	.035	1.61	40.0	13,569	1.01	.0332	1.24	.7055
01-4975.00	349	.155	1.63	40.0	81,311	1.39	.0011	1.31	.6760
01-4975.30	5.55	.054	1.71	40.0	16,895	1.03	.0225	1.96	.6965
01-4979.02	12.0	.058	1.58	41.5	24,287	1.03	.0097	1.86	.6770
01-4979.10	12.9	.074	1.57	41.5	30,623	1.02	.0173	2.70	.6768
01-4979.85	25.6	.053	1.57	41.5	24,023	1.00	.0112	0.81	.6721
01-4985.00	164.5	.103	1.55	41.5	100,320	1.12	.0047	2.76	.6773
01-4990.00	108	.153	1.57	40.5	100,320	1.33	.0038	5.88	.6787
01-4990.24	6.78	.041	1.58	41.5	26,400	1.04	.0288	3.99	.7028
01-4990.50	4.22	.036	1.56	41.0	23,760	1.03	.0227	5.08	.6971
01-4991.95	6.96	.037	1.58	41.0	23,231	1.05	.0164	3.04	.6907
01-4993.00	8.27	.024	1.71	42.0	23,231	1.10	.0198	2.84	.6598
01-4994.70	9.12	.035	1.67	41.5	31,680	1.07	.0189	4.49	.6664
01-5000.00	103	.067	1.65	41.5	95,567	1.10	.0087	3.84	.6775
01-5005.00	982	.14	1.62	41.0	204,335	1.28	.0010	2.49	.6756
01-5009.83	10.9	.045	1.59	40.0	23,337	1.11	.0105	2.21	.6830
01-5010.00	199	.197	1.63	39.0	86,063	1.63	.0012	3.53	.6761
01-5011.90	84.4	.168	1.64	40.0	105,600	1.44	.0025	9.83	.6771
01-5015.00	0.70	.00	1.53	41.0	7,920	1.00	.0379	3.21	.7013
01-5019.00	16.0	.078	1.66	40.0	43,876	1.06	.0100	4.86	.6844
01-5020.00	59.6	.134	1.62	40.0	102,960	1.08	.0068	7.40	.6812
01-5025.00	520	.177	1.62	40.0	202,751	1.39	.0010	5.50	.6760
01-5025.50	17.8	.031	1.52	41.5	39,600	1.04	.0152	3.42	.6887
01-5026.70	25.4	.039	1.68	40.0	20,591	1.46	.0010	1.28	.6746
01-5028.99	30.6	.024	1.47	38.0	43,823	1.08	.0131	2.65	.6795
01-5030.00	2,232	.16	1.60	41.0	426,095	1.40	.0008	5.73	.6756
01-5050.00	263	.22	1.57	39.0	79,200	1.34	.0028	1.53	.6778
01-5055.00	57.9	.055	1.78	41.0	48,575	1.14	.0130	1.89	.6839
01-5060.50	15.0	.019	1.47	40.0	26,927	1.06	.0189	1.94	.6628
01-5070.00	593	.14	1.54	40.0	266,111	1.22	.0014	6.30	.6764
01-5071.00	10.1	.040	1.69	41.0	32,207	1.03	.0115	3.93	.6860
01-5074.70	7.06	.065	1.70	41.0	30,623	1.02	.0101	4.93	.6845
01-5075.00	82.3	.057	1.68	40.0	29,040	1.67	.0162	1.02	.6908
01-5079.75	2.67	.011	1.76	40.0	12,777	1.00	.0528	2.19	.7269
01-5080.00	2.95	.020	1.89	40.0	12,143	1.00	.0553	1.79	.7297
01-5085.00	6.81	.029	1.76	41.0	19,007	1.24	.0231	2.92	.6973
01-5088.03	71.5	.310	1.58	40.5	59,135	1.29	.0048	2.94	.6795
01-5090.00	292	.226	1.67	40.0	99,263	1.24	.0057	1.86	.6798
01-5093.00	10.8	.062	1.74	40.0	30,623	1.05	.0150	3.45	.6898
01-5100.00	147	.145	1.83	40.0	102,431	1.28	.0039	4.22	.6782
01-5115.00	730	.146	1.71	40.0	236,015	1.20	.0031	3.92	.6781
01-5115.50	18.5	.076	1.53	40.0	35,375	1.18	.0083	3.37	.6832
01-5125.00	1,483	.14	1.62	40.0	309,407	1.22	.0013	3.41	.6763
01-5127.80	8.69	.230	1.39	38.0	25,343	1.04	.0164	2.88	.6907
01-5127.97	27.7	.036	1.39	38.0	41,183	1.04	.0097	2.37	.6841
01-5131.90	12.2	.027	1.38	37.5	32,471	1.22	.0125	4.61	.6871
01-5132.80	3.96	.025	1.39	37.5	16,262	1.02	.0283	2.51	.7033
01-5135.00	3,960	.15	1.61	40.0	518,495	1.34	.0008	4.38	.6755
01-5138.29	19.7	.035	1.37	36.0	31,680	1.02	.0152	1.89	.6866
01-5138.40	8.59	.047	1.30	35.5	31,468	1.03	.0159	4.36	.6620
01-5138.62	5.77	.026	1.61	38.0	10,560	1.01	.0369	0.70	.6876
01-5140.00	185	.128	1.49	36.0	127,775	1.34	.0055	5.64	.6804
01-5142.98	8.64	.038	1.27	35.0	33,791	1.02	.0155	4.89	.6904
01-5146.63	8.49	.330	1.32	35.5	15,311	1.47	.0021	2.13	.6771
01-5148.20	4.13	.012	1.31	36.0	18,480	1.03	.0176	3.14	.6915
01-5148.39	6.78	.016	1.27	35.5	26,927	1.01	.0123	3.88	.6631
01-5150.00	4,773	.145	1.55	40.0	694,320	1.27	.0007	5.80	.6754
01-5155.80	4.76	.015	1.03	33.6	17,951	1.01	.0192	2.46	.6942
01-5158.50	5.26	.023	1.22	34.5	21,859	1.00	.0252	3.27	.7002
01-5205.00	771	.027	1.05	36.0	185,855	1.05	.0050	1.78	.6702
01-5205.20	9.27	.011	0.92	35.5	23,495	1.07	.0149	2.43	.6671
01-5209.90	21.6	.038	1.10	24.0	26,400	1.06	.0129	1.30	.6759
01-5215.00	30.6	.095	1.10	35.0	44,880	1.08	.0094	2.78	.6718

Appendix B.--Physiographic characteristics of basins (Continued)

USGS station number	Area of drainage basin (sq mi)	Percentage area of sand and gravel (decimal)	Mean runoff (cfsm)	Mean annual precipitation (inches)	Valley length (feet)	Sinuosity	Valley slope	(Length)^2 divided by Area	Solar energy factor
01-5216.10	16.8	0.052	0.99	34.0	23,231	1.02	0.0112	1.21	0.6750
01-5220.00	a/ 82.0	.238	1.16	34.3	79,200	1.10	.0063	3.32	.6766
01-5223.00	17.1	.187	1.09	35.8	21,120	1.25	.0189	1.46	.6572
01-5225.00	27.4	.088	1.10	35.6	26,400	1.20	.0184	1.31	.6782
01-5235.00	57.9	.164	1.07	35.2	52,800	1.10	.0124	2.06	.6698
01-5245.00	a/145	.21	1.04	36.5	83,423	1.09	.0061	2.05	.6750
01-5245.50	5.34	.023	0.99	36.0	19,271	1.04	.0322	2.70	.7052
01-5255.00	340	.135	1.03	36.5	165,791	1.08	.0036	3.34	.6763
01-5257.50	9.43	.049	0.95	36.0	26,188	1.01	.0130	2.65	.6834
01-5258.00	7.4	.045	0.95	36.0	22,440	1.10	.0149	2.96	.6750
01-5260.00	114	.060	0.87	37.0	89,760	1.02	.0070	2.63	.6768
01-5264.95	5.06	.014	0.95	36.0	13,991	1.03	.0425	1.34	.6477
01-5265.00	1,377	.065	1.02	36.5	222,287	1.06	.0043	1.46	.6775
01-5269.80	4.64	.030	1.06	32.0	13,200	1.08	.0280	1.56	.6864
01-5270.00	52.2	.306	1.00	34.0	68,640	1.19	.0056	4.51	.6803
01-5274.50	9.23	.325	1.03	34.0	24,815	1.04	.0163	2.60	.6613
01-5276.00	17.9	.246	1.04	36.0	26,400	1.06	.0106	1.58	.6723
01-5280.00	66.8	.216	1.06	32.0	79,200	1.15	.0016	4.35	.6766
01-5295.00	470	.18	0.96	34.5	196,415	1.17	.0034	4.01	.6766
01-5302.40	3.77	.003	0.98	35.0	13,358	1.00	.0221	1.71	.6529
01-5304.50	5.26	.015	1.10	35.0	16,684	1.02	.0626	1.95	.6641
01-5305.00	77.5	.217	1.10	34.0	79,200	1.20	.0065	4.06	.6802
01-5310.00	2,530	.11	1.02	35.0	410,255	1.15	.0022	3.13	.6758
01-5315.00	7,797	.13	1.35	37.0	799,920	1.24	.0006	4.56	.6756
b/	70.3	.346	1.31	34.0	52,800	1.10	.0017	1.70	.6750
c/	73.7	.324	1.66	40.9	59,135	1.29	.0048	2.85	.6795

a/ Area shown is measured drainage area minus 13 sq mi above Hornell municipal reservoirs on Carrington Creek, from which water is diverted and bypasses station.

b/ Canisteo River below Canacadea Creek at Hornell, station 01-5245.00, minus stations 01-5215.00, 01-5216.10, 01-5225.00 and minus 13 sq mi above Hornell municipal reservoirs on Carrington Creek.

c/ West Branch Tioughnioga River at Homer, station 01-5088.03, plus a small area near Tully draining via numerous springs to Onondaga Creek (St. Lawrence River basin).

Appendix C.--Chemical analyses of precipitation

Sample Collection: Precipitation was collected in a translucent plastic cylindrical funnel, diameter 0.35 foot (0.11 meter), placed in an open area 6 feet (1.8 meters) above ground level and draining through glass-wool filtering fibre and a narrow tube into a translucent plastic bottle in which the samples were stored until collected. Stations were visited to pick up stored samples near the first of each month, except February; samples dated about February 15 (or, for some stations, March 1) represent intervals longer than 1 month. Missing dates for some stations in the table indicate that samples were not obtained because of some problem with the collector, or were not analyzed because of obvious contamination by bird droppings or insects in the open funnel.

Station location:

Station	Latitude ° ' "	Longitude ° ' "	Nearest Community
1	42 55 11	75 07 07	Cedarville
2	42 55 26	75 30 20	Solsville
3	42 38 09	74 44 24	Decatur
4	42 38 10	75 09 04	Garratsville
5	42 37 56	75 30 01	North Norwich
6	42 37 55	75 53 03	Union Valley
7	42 20 37	74 45 24	South Kortright
8	42 21 35	75 07 23	Leonta
9	42 21 47	75 29 55	Yaleville
10	42 20 44	75 53 58	Triangle
11	42 22 34	76 17 08	Caroline
12	42 22 41	76 38 54	Trumbull Corners
13	42 23 35	77 03 30	Tyrone
14	42 21 43	77 29 08	Howard
15	42 22 08	77 48 40	Bishopville
16	42 05 10	75 31 18	Gulf Summit
17	42 04 07	75 55 35	Binghamton
18	42 04 03	76 19 45	Lounsberry
19	42 03 48	76 39 59	Lowman
20	42 04 51	77 04 23	West Caton
21	42 04 42	77 28 21	Woodhull

Analytical data: mg = milligrams; mg/l = milligrams per liter. In milligrams columns, 0.0 generally indicates total weight not calculated owing to lack of data on sample volume. In other columns, 0.0 indicates absence of constituent, 0.0 B indicates parameter was not determined.

Appendix C.--Chemical analyses of precipitation (Continued)

Date of collection	Station	Calcium (mg/l)	Calcium (mg)	Magnesium (mg/l) a/	Magnesium (mg)	Sulfate (mg/l)	Sulfate (mg)	Chloride (mg/l) b/	Chloride (mg)	Hardness (Ca, Mg as $CaCO_3$) (mg/l)	Specific conductance (micromhos per cm at 25°C)	pH
102865	1	1.00	0.0	0.13	0.0	3.90	3.61	0.50	0.46	3.00	24.00	0.0 B
112965	1	0.90	0.70	0.09	0.10	5.20	4.30	0.45	0.30	2.00	42.00	4.50
123065	1	1.40	0.40	0.19	0.05	5.70	1.50	0.50	0.10	4.00	48.00	4.30
030366	1	0.70	0.70	0.09	0.10	4.25	4.00	0.55	0.50	2.00	29.00	0.0 B
033166	1	2.70	0.0	0.16	0.0	3.30	0.0	0.95	0.0	7.00	42.00	4.70
042966	1	1.30	0.0	0.14	0.0	9.80	0.0	0.0 B	0.0	4.00	59.00	4.25
063066	1	2.60	0.0	0.22	0.0	8.70	0.0	0.95	0.0	8.00	43.00	4.90
080466	1	1.40	1.10	0.38	0.30	6.40	4.90	1.35	1.00	5.00	42.00	6.40
083166	1	1.00	0.60	0.17	0.10	8.60	5.40	0.40	0.20	3.00	36.00	4.60
100466	1	0.30	0.30	0.05	0.0	0.60	0.60	0.0	0.0	0.50	17.00	4.70
102865	2	1.00	0.0	0.13	0.0	3.90	3.68	0.50	0.47	3.00	19.00	0.0 B
112965	2	0.90	0.80	0.15	0.20	5.60	4.80	0.60	0.50	2.00	41.00	4.40
123065	2	1.00	0.40	0.30	0.10	5.50	2.30	0.75	0.30	4.00	44.00	4.30
030266	2	0.60	0.60	0.28	0.30	3.25	3.30	0.90	0.90	2.00	25.00	0.0 B
033166	2	1.50	0.0	0.23	0.0	6.10	0.0	0.70	0.0	4.00	41.00	4.50
042966	2	2.20	0.0	0.25	0.0	6.30	0.0	0.45	0.0	6.00	33.00	4.85
053166	2	1.90	0.0	0.26	0.0	6.60	0.0	0.50	0.0	6.00	55.00	4.30
063066	2	0.30	0.0	0.48	0.0	0.0 B	0.0	2.55	0.0	2.00	54.00	4.65
080466	2	1.30	0.80	0.42	0.20	3.35	1.90	0.55	0.30	4.00	38.00	6.18
090266	2	0.60	0.90	0.13	0.20	7.30	10.80	0.15	0.20	2.00	52.00	4.20
100466	2	0.50	0.60	0.12	0.20	3.60	4.50	0.0	0.0	2.00	19.00	4.80
102865	3	1.00	0.0	0.13	0.0	4.90	5.36	0.20	0.22	3.00	38.00	0.0 B
112965	3	0.40	0.0	0.42	0.0	4.75	0.0	0.40	0.0	2.00	26.00	6.30
030266	3	0.40	0.30	0.15	0.10	3.10	2.50	0.30	0.20	2.00	31.00	0.0 B
040166	3	0.90	0.0	0.09	0.0	4.50	0.0	0.50	0.0	2.00	53.00	4.10
042766	3	0.60	0.0	0.70	0.0	4.25	0.0	0.40	0.0	2.00	48.00	4.10
053166	3	2.20	0.0	0.10	0.0	6.40	0.0	0.35	0.0	6.00	41.00	4.50
070166	3	0.60	0.0	0.11	0.0	7.50	0.0	0.20	0.0	2.00	66.00	3.95
080366	3	0.60	0.60	0.19	0.20	0.0	0.0	0.40	0.40	2.00	31.00	4.80
083165	3	0.70	0.20	0.13	0.0	9.40	3.30	0.0	0.0	2.00	56.00	4.10
100466	3	0.20	0.30	0.04	0.0	3.80	5.30	0.0	0.0	0.50	22.00	4.50
053166	4	3.30	0.0	0.14	0.0	5.80	0.0	0.45	0.0	8.00	31.00	5.00
063066	4	2.20	0.0	0.19	0.0	7.50	0.0	0.0	0.0	6.00	47.00	4.40
080366	4	1.50	1.30	0.25	0.20	9.60	8.40	1.35	1.20	4.00	44.00	4.60
083166	4	2.00	0.90	0.19	0.10	12.00	5.40	0.15	0.01	6.00	66.00	4.10
100466	4	0.80	1.00	0.07	0.10	2.90	3.80	0.0	0.0	2.00	20.00	4.60
102865	4	1.30	0.0	0.20	0.0	5.60	2.83	0.50	0.25	4.00	29.00	0.0 B
112965	4	7.60	2.50	0.02	0.01	8.30	2.80	1.20	0.40	19.00	55.00	6.80
123065	4	6.20	2.00	0.09	0.03	5.00	1.60	1.50	0.50	16.00	39.00	7.10
030366	4	3.40	3.10	0.15	0.10	3.05	2.80	0.30	0.30	9.00	24.00	0.0 B
040166	4	4.00	0.0	0.11	0.0	6.00	0.0	0.50	0.0	10.00	32.00	5.80
042966	4	3.20	0.0	0.10	0.0	5.50	0.0	0.40	0.0	8.00	28.00	6.00
102865	5	2.40	0.0	0.25	0.0	7.00	6.72	0.50	0.48	7.00	81.00	0.0 B
112965	5	0.70	0.40	0.23	0.10	6.70	4.40	0.50	0.30	2.00	42.00	4.50
123165	5	0.90	0.30	0.13	0.03	6.50	2.10	0.50	0.20	2.00	52.00	4.25
030266	5	0.50	0.10	0.22	0.10	7.10	2.00	0.40	0.10	2.00	43.00	0.0 B
033166	5	1.30	0.0	0.17	0.0	2.10	0.0	0.50	0.0	4.00	31.00	4.95
080366	5	1.00	0.70	0.26	0.29	4.80	3.50	0.15	0.10	4.00	26.00	6.30
100466	5	0.80	0.70	0.23	0.20	4.40	4.00	2.20	2.00	3.00	22.00	6.30
102865	6	0.60	0.0	0.12	0.0	3.50	4.27	0.50	0.61	2.00	24.00	0.0 B

Appendix C.--Chemical analyses of precipitation (Continued)

Date of collection	Station	Calcium (mg/l)	Calcium (mg)	Magnesium (mg/l) a/	Magnesium (mg)	Sulfate (mg/l)	Sulfate (mg)	Chloride (mg/l) b/	Chloride (mg)	Hardness (Ca, Mg as $CaCO_3$) (mg/l)	Specific conductance (micromhos per cm at 25°C)	pH
112965	6	0.50	0.60	0.28	0.30	4.90	5.50	0.50	0.60	2.00	42.00	4.30
123165	6	0.50	0.20	0.12	0.05	5.20	2.50	0.90	0.40	2.00	46.00	4.35
030266	6	0.20	0.20	0.31	0.40	3.70	4.40	0.40	0.50	2.00	23.00	0.0 B
033166	6	0.80	0.0	0.16	0.0	5.30	0.0	0.55	0.0	2.00	45.00	4.40
042866	6	0.90	0.0	0.18	0.0	6.10	0.0	0.50	0.0	2.00	38.00	6.70
053166	6	1.20	0.0	0.15	0.0	5.80	0.0	0.45	0.0	4.00	44.00	4.40
062966	6	0.50	0.0	0.13	0.0	7.90	0.0	0.20	0.0	2.00	29.00	5.12
080466	6	0.60	0.70	0.13	0.20	3.10	3.80	0.35	0.40	2.00	30.00	4.75
083166	6	0.60	0.40	0.11	0.10	8.40	5.00	1.00	0.60	2.00	68.00	4.10
100466	6	0.30	0.30	0.08	0.10	3.30	3.60	0.0	0.0	1.00	25.00	4.50
113065	7	2.40	1.50	0.71	0.40	8.70	5.40	2.95	1.90	9.00	56.00	7.10
123065	7	3.60	1.10	0.18	1.00	7.50	2.40	1.65	0.50	10.00	46.00	6.40
030366	7	2.70	2.30	0.18	0.20	3.65	3.10	0.55	0.50	7.00	25.00	0.0 B
040166	7	3.10	0.0	0.15	0.0	5.80	0.0	0.70	0.0	8.00	39.00	4.80
042766	7	3.00	0.0	0.12	0.0	5.60	0.0	0.70	0.0	8.00	33.00	6.30
053166	7	3.70	0.0	0.20	0.0	7.30	0.0	0.95	0.0	5.00	40.00	6.40
080366	7	2.80	3.60	0.19	0.20	6.20	8.00	0.40	0.50	8.00	40.00	6.60
083166	7	3.10	1.90	0.12	0.10	11.00	6.90	0.60	0.40	8.00	38.00	6.60
100366	7	1.40	2.00	0.06	0.10	4.20	5.90	0.15	0.20	4.00	12.00	5.40
102965	8	1.00	0.0	0.13	0.0	7.00	2.80	1.00	0.40	3.00	41.00	0.0 B
113065	8	0.50	0.20	0.10	0.05	6.30	3.00	0.35	0.20	2.00	49.00	4.30
123065	8	0.70	0.20	0.09	0.04	5.50	1.90	0.90	0.30	2.00	47.00	4.50
030366	8	0.70	0.40	0.20	0.10	5.60	3.40	0.90	0.50	2.00	41.00	0.0 B
040166	8	1.20	0.0	0.10	0.0	5.60	0.0	0.70	0.0	4.00	62.00	4.10
042766	6	1.20	0.0	0.12	0.0	7.40	0.0	0.70	0.0	4.00	65.00	4.10
053166	8	1.40	0.0	0.10	0.0	6.20	0.0	0.50	0.0	4.00	50.00	4.20
070166	8	0.50	0.0	0.11	0.0	5.00	0.0	0.35	0.0	2.00	33.00	4.40
080366	8	1.20	0.60	0.41	0.20	6.60	3.70	1.25	0.70	4.00	49.00	6.70
090266	8	1.00	0.40	0.25	0.10	11.00	3.00	0.40	0.10	4.00	67.00	4.10
100366	8	0.40	0.40	0.08	0.10	20.00	19.50	0.0	0.0	2.00	27.00	4.40
102965	9	0.60	0.0	0.12	0.0	3.90	6.28	0.50	0.80	2.00	20.00	0.0 B
113065	9	0.60	0.30	0.12	0.10	6.10	3.40	0.35	0.20	2.00	55.00	4.15
123165	9	0.40	0.20	0.12	0.04	4.90	2.00	0.30	0.10	2.00	47.00	4.20
030366	9	0.80	0.80	0.14	0.10	4.50	4.50	0.35	0.40	2.00	30.00	0.0 B
033166	9	0.80	0.0	0.11	0.0	4.90	0.0	0.50	0.0	2.00	53.00	4.10
042766	9	0.80	0.0	0.12	0.0	6.70	0.0	0.45	0.0	2.00	58.00	4.05
060166	9	0.90	0.0	0.13	0.0	6.20	0.0	0.60	0.0	2.00	50.00	4.30
100366	9	4.40	0.80	0.57	0.10	8.20	1.40	0.0	0.0	14.00	57.00	4.40
102965	10	0.60	0.0	0.12	0.0	3.10	4.03	0.50	0.65	2.00	21.00	0.0 B
112965	10	0.40	0.20	0.05	0.03	5.00	2.80	0.40	0.20	1.00	44.00	4.20
021466	10	0.30	0.30	0.60	0.05	2.05	1.90	0.20	0.20	0.50	13.00	0.0 B
040166	10	0.80	0.0	0.11	0.0	5.40	0.0	0.50	0.0	2.00	59.00	4.10
042766	10	0.60	0.0	0.09	0.0	5.60	0.0	0.45	0.0	2.00	52.00	4.00
053166	10	0.90	0.0	0.14	0.0	5.60	0.0	0.50	0.0	2.00	47.00	4.20
062866	10	0.50	0.0	0.12	0.0	4.60	0.0	0.20	0.0	2.00	26.00	4.55
080266	10	1.20	0.80	0.29	0.20	1.85	1.20	1.30	0.80	4.00	34.00	6.30
083166	10	1.20	0.70	0.15	0.10	8.60	4.70	0.40	2.00	4.00	51.00	4.20
100266	10	1.10	1.10	0.29	0.30	3.80	3.70	0.50	0.50	4.00	24.00	6.20
102865	11	0.60	0.0	0.12	0.0	3.30	2.51	0.80	0.61	2.00	17.00	0.0 B
112965	11	0.40	0.30	0.05	0.03	4.10	2.70	0.25	0.10	1.00	36.00	4.40

Appendix C.--Chemical analyses of precipitation (Continued)

Date of collection	Station	Calcium (mg/l)	Calcium (mg)	Magnesium (mg/l) a/	Magnesium (mg)	Sulfate (mg/l)	Sulfate (mg)	Chloride (mg/l) b/	Chloride (mg)	Hardness (Ca, Mg as $CaCO_3$) (mg/l)	Specific conductance (micromhos per cm at 25°C)	pH
123065	11	0.50	0.20	0.06	0.05	4.40	2.20	0.45	0.20	1.00	50.00	4.20
021466	11	0.20	0.20	0.14	0.10	2.35	2.00	0.15	0.10	1.00	14.00	0.0 B
030266	11	0.30	0.10	0.14	0.04	3.45	1.00	0.15	0.04	1.00	39.00	0.0 B
040166	11	0.80	0.0	0.10	0.0	5.30	0.0	0.60	0.0	2.00	56.00	4.10
042766	11	0.60	0.0	0.11	0.0	5.80	0.0	0.30	0.0	2.00	48.00	4.10
053166	11	0.80	0.0	0.13	0.0	5.30	0.0	0.30	0.0	2.00	47.00	4.15
062866	11	0.50	0.0	0.13	0.0	4.60	0.0	0.0	0.0	2.00	38.00	4.35
080266	11	0.80	0.40	0.16	0.10	2.10	1.00	0.30	0.10	2.00	46.00	4.45
083166	11	1.00	0.50	0.12	0.10	8.20	4.10	0.0	0.0	3.00	48.00	4.30
100266	11	0.70	0.90	0.21	0.30	3.80	4.80	0.0	0.0	2.00	18.00	6.10
102865	12	1.30	0.0	0.20	0.0	4.30	2.88	0.80	0.54	4.00	21.00	0.0 B
112965	12	0.40	0.30	0.09	0.10	4.35	3.00	0.30	0.20	2.00	39.00	4.35
123065	12	0.60	0.20	0.13	0.04	5.50	2.10	0.40	0.20	2.00	34.00	4.60
021466	12	0.30	0.20	0.25	0.20	2.80	1.90	0.15	0.10	2.00	18.00	0.0 B
030366	12	0.40	0.10	0.28	0.10	4.20	1.00	0.30	0.10	2.00	44.00	0.0 B
033166	12	0.70	0.0	0.10	0.0	6.00	0.0	0.50	0.0	2.00	63.00	4.10
080266	12	1.20	0.60	0.41	0.20	5.20	2.50	2.40	1.20	4.00	58.00	6.60
100266	12	0.40	0.50	0.15	0.20	3.10	3.80	1.20	1.50	2.00	18.00	5.60
112965	13	0.10	0.10	0.08	0.10	7.50	4.20	0.45	0.20	0.50	31.00	4.90
123065	13	0.30	0.10	0.09	0.03	5.60	1.90	0.70	0.20	1.00	41.00	4.55
030366	13	0.10	0.10	0.23	0.20	2.90	2.60	0.55	0.50	1.00	36.00	0.0 B
033166	13	0.90	0.0	0.11	0.0	5.90	0.0	0.65	0.0	2.00	68.00	4.50
042766	13	1.00	0.0	0.19	0.0	8.60	0.0	1.05	0.0	4.00	70.00	4.15
053166	13	1.10	0.0	0.15	0.0	4.35	0.0	0.35	0.0	3.00	44.00	4.70
080266	13	1.10	0.70	0.27	0.20	8.30	5.30	2.85	1.80	4.00	50.00	5.65
083166	13	1.60	0.80	0.52	0.20	8.80	4.20	0.75	0.40	4.00	54.00	6.40
100266	13	0.70	0.80	0.20	0.20	2.50	2.80	0.65	0.70	2.00	22.00	6.00
102865	14	0.60	0.0	0.12	0.0	7.00	3.68	0.50	0.26	2.00	21.00	0.0 B
112965	14	0.30	0.20	0.09	0.10	3.75	2.40	0.30	0.20	1.00	32.00	4.50
123065	14	0.40	0.20	0.05	0.02	3.75	1.50	0.50	0.20	1.00	37.00	4.30
030366	14	0.80	0.40	0.29	0.10	3.60	1.80	1.20	0.60	3.00	30.00	0.0 B
033166	14	0.90	0.0	0.14	0.0	6.00	0.0	0.70	0.0	2.00	52.00	4.20
042766	14	1.20	0.0	0.22	0.0	6.70	0.0	0.50	0.0	4.00	52.00	4.20
053166	14	1.20	0.0	0.20	0.0	5.40	0.0	0.35	0.0	4.00	40.00	4.50
062966	14	0.70	0.0	0.16	0.0	27.00	0.0	0.20	0.0	2.00	45.00	4.30
080366	14	2.40	0.90	0.65	0.20	9.40	3.50	0.0 B	0.0	8.00	108.00	6.80
090266	14	2.00	0.60	0.41	0.10	9.60	2.90	0.40	0.10	6.00	42.00	4.60
102865	15	1.30	0.0	0.20	0.0	4.30	2.36	0.50	0.28	4.00	23.00	0.0 B
112965	15	0.60	0.30	0.07	0.05	3.75	1.90	0.25	0.10	2.00	33.00	4.50
123065	15	0.30	0.10	0.09	0.04	4.45	1.50	0.30	0.10	1.00	43.00	4.30
021466	15	0.30	0.10	0.29	0.10	3.45	0.90	1.00	0.20	2.00	38.00	0.0 B
030266	15	0.40	0.10	0.28	0.10	4.15	0.80	0.90	0.20	2.00	32.00	0.0 B
040166	15	0.70	0.0	0.10	0.0	5.60	0.0	0.40	0.0	2.00	54.00	4.10
042766	15	1.00	0.0	0.33	0.0	7.40	0.0	0.70	0.0	4.00	41.00	6.60
053166	15	1.20	0.0	0.23	0.0	5.50	0.0	0.35	0.0	4.00	39.00	4.40
062966	15	0.80	0.0	0.32	0.0	7.90	0.0	0.15	0.0	4.00	27.00	5.70
080366	15	1.80	0.90	0.64	0.30	8.30	4.40	1.25	0.60	7.00	41.00	5.50
090266	15	2.30	0.70	0.57	0.20	10.00	3.20	1.45	0.50	8.00	58.00	6.30
100266	15	1.30	0.50	0.19	0.10	6.10	2.40	0.25	0.10	4.00	36.00	4.50
102965	16	1.90	0.0	0.30	0.0	7.40	5.92	0.30	0.24	6.00	62.00	0.0 B

Appendix C.--Chemical analyses of precipitation (Continued)

Date of collection	Station	Calcium (mg/l)	Calcium (mg)	Magnesium (mg/l) a/	Magnesium (mg)	Sulfate (mg/l)	Sulfate (mg)	Chloride (mg/l) b/	Chloride (mg)	Hardness (Ca, Mg as $CaCO_3$) (mg/l)	Specific conductance (micromhos per cm at 25°C)	pH
113065	16	0.40	0.20	0.51	0.30	12.00	6.70	0.90	0.50	3.00	89.00	7.00
123165	16	0.40	0.20	0.06	0.04	5.60	2.20	0.45	0.20	1.00	34.00	6.60
030166	16	0.30	0.20	0.31	0.20	4.40	2.60	0.30	0.20	2.00	30.00	0.0 B
033166	16	0.70	0.0	0.09	0.0	4.75	0.0	0.60	0.0	2.00	53.00	4.20
042766	16	0.80	0.0	0.41	0.0	10.00	0.0	1.20	0.0	4.00	79.00	7.30
080366	16	0.80	0.70	0.29	0.30	4.35	4.00	0.35	0.30	3.00	30.00	6.30
100366	16	0.40	0.70	0.11	0.20	5.40	8.90	0.0	0.0	2.00	33.00	4.40
102965	17	0.60	0.0	0.12	0.0	3.90	2.00	0.20	0.10	2.00	20.00	0.0 B
112965	17	0.60	0.30	0.09	0.05	6.00	2.80	0.45	0.20	2.00	49.00	4.25
123165	17	0.40	0.10	0.12	0.04	5.20	1.00	0.35	0.10	2.00	44.00	4.20
021666	17	0.30	0.30	0.28	0.30	3.05	2.80	1.15	1.10	2.00	31.00	0.0 B
030166	17	0.50	0.10	0.21	0.10	2.95	0.80	0.65	0.20	2.00	29.00	0.0 B
040166	17	0.90	0.0	0.11	0.0	5.80	0.0	0.55	0.0	2.00	51.00	4.10
070166	17	0.70	0.0	0.18	0.0	5.40	0.0	0.10	0.0	2.00	24.00	4.80
080466	17	0.80	0.70	0.19	0.20	6.00	5.10	0.35	0.30	3.00	40.00	4.50
090266	17	0.50	0.30	0.08	0.0	4.80	3.10	0.0	0.0	2.00	32.00	4.40
100366	17	0.50	0.50	0.08	0.10	5.00	5.00	1.90	1.90	2.00	28.00	4.50
102965	18	1.00	0.0	0.13	0.0	3.50	2.73	0.50	0.39	3.00	23.00	0.0 B
113065	18	0.40	0.20	0.13	0.04	6.60	2.70	0.40	0.20	2.00	48.00	4.30
123165	18	0.10	0.03	0.03	0.01	4.00	1.20	0.25	0.06	0.40	36.00	4.30
021566	18	0.20	0.14	0.13	0.10	3.40	2.40	3.10	0.07	1.00	30.00	0.0 B
030166	18	0.20	0.06	0.13	0.04	3.10	0.90	0.10	0.03	1.00	39.00	0.0 B
033166	18	0.80	0.0	0.10	0.0	5.70	0.0	0.45	0.0	2.00	61.00	4.05
042766	18	0.80	0.0	0.15	0.0	7.20	0.0	0.40	0.0	2.00	62.00	4.00
060166	18	0.90	0.0	0.15	0.0	5.50	0.0	0.30	0.0	2.00	45.00	4.15
070166	18	0.60	0.0	0.15	0.0	7.10	0.0	0.20	0.0	2.00	28.00	4.65
080366	18	1.50	1.40	0.52	0.50	6.60	6.00	0.75	0.70	6.00	51.00	6.20
090266	18	2.20	0.90	0.75	0.30	7.10	3.00	1.40	0.60	8.00	72.00	0.0 B
100266	18	1.00	0.90	0.36	0.30	5.20	4.60	2.35	2.00	4.00	21.00	5.50
102965	19	1.60	0.0	0.25	0.0	5.60	1.82	0.70	0.23	5.00	31.00	0.0 B
113065	19	0.20	0.10	0.05	0.02	4.20	2.10	0.50	0.20	0.50	42.00	4.30
123165	19	0.40	0.10	0.15	0.04	5.80	1.00	0.30	0.05	2.00	50.00	4.10
021566	19	0.0	0.0	0.18	0.20	2.10	1.80	0.10	0.10	0.50	27.00	0.0 B
030266	19	0.30	0.10	0.25	0.10	3.85	0.80	0.50	0.10	2.00	40.00	0.0 B
033166	19	1.00	0.0	0.25	0.0	6.30	0.0	0.50	0.0	4.00	35.00	6.30
042766	19	1.30	0.0	0.30	0.0	8.10	0.0	0.90	0.0	4.00	68.00	6.90
060166	19	1.70	0.0	0.20	0.0	5.80	0.0	0.55	0.0	5.00	30.00	5.10
062966	19	1.00	0.0	0.36	0.0	7.50	0.0	0.45	0.0	4.00	32.00	6.20
080366	19	1.30	0.70	0.39	0.20	2.30	1.30	0.40	0.20	4.00	44.00	6.65
090266	19	0.80	0.30	0.16	0.10	6.10	2.40	0.0	0.0	2.00	30.00	4.50
100266	19	0.20	0.20	0.07	0.10	4.20	4.10	0.0	0.0	0.50	28.00	4.40
102965	20	1.00	0.0	0.13	0.0	2.90	1.66	0.50	0.31	3.00	22.00	0.0 B
113065	20	0.10	0.10	0.10	0.10	3.40	2.10	0.30	0.20	0.50	33.00	4.30
123165	20	0.40	0.10	0.09	0.03	4.85	1.40	0.55	0.20	2.00	44.00	4.15
021566	20	0.30	0.20	0.14	0.10	2.05	1.70	0.10	0.10	1.00	14.00	0.0 B
030266	20	0.20	0.10	0.16	0.10	2.05	0.60	0.30	0.10	1.00	25.00	0.0 B
040166	20	0.90	0.0	0.15	0.0	6.50	0.0	0.50	0.0	2.00	40.00	4.50
042766	20	1.80	0.0	0.20	0.0	6.40	0.0	0.65	0.0	6.00	32.00	5.10
062966	20	0.60	0.0	0.27	0.0	4.60	0.0	0.40	0.0	2.00	25.00	6.60
090266	20	2.60	0.30	0.90	0.10	17.00	2.10	0.0 B	0.0	10.00	105.00	7.00

Appendix C.--Chemical analyses of precipitation (Continued)

Date of collection	Station	Calcium (mg/l)	Calcium (mg)	Magnesium (mg/l) a/	Magnesium (mg)	Sulfate (mg/l)	Sulfate (mg)	Chloride (mg/l) b/	Chloride (mg)	Hardness (Ca, Mg as $CaCO_3$) (mg/l)	Specific conductance (micromhos per cm at 25°C)	pH
100266	20	0.50	0.50	0.15	0.20	3.80	4.00	0.0	0.0	2.00	19.00	4.70
112965	21	0.20	0.10	0.08	0.10	3.45	2.30	0.30	0.20	1.00	18.00	5.30
123165	21	0.30	0.10	0.08	0.03	4.70	1.40	0.15	0.10	1.00	40.00	4.20
021566	21	0.10	0.10	0.01	0.0	2.30	1.60	0.10	0.10	0.0	26.00	0.0 B
030266	21	0.20	0.10	0.14	0.04	2.50	0.70	0.30	0.10	1.00	29.00	0.0 B
040166	21	1.00	0.0	0.12	0.0	5.80	0.0	0.60	0.0	3.00	66.00	4.00
042766	21	0.80	0.0	0.31	0.0	7.20	0.0	0.65	0.0	3.00	39.00	6.50
100266	21	1.70	2.10	0.30	0.40	5.00	6.20	1.75	2.20	5.00	26.00	5.90

a/Reported to nearest 0.01 mg/l below 1 mg/l.
b/Reported to nearest 0.05 mg/l below 5 mg/l.

Appendix D.--Chemical analyses of water from apparent overland runoff, shallow ground-water discharge, springs, and small streams

D1.--Apparent overland runoff and shallow ground-water discharge at a site in the town of Binghamton, New York

[Samples were collected about half a mile south of Binghamton city line, at a point along Murphy Road (abandoned) 100 feet uphill from Brown Road at latitude 42°04'74", longitude 75°55'37" except as otherwise noted. Chemical constituents and hardness in milligrams per liter except pH and specific conductance. Results for sodium and potassium combined were calculated. Analyses by U.S. Geological Survey, Albany, N.Y.]

Date	Time (24-hour)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Hardness (Ca, Mg) (as $CaCO_3$)	Specific conductance (micromhos per cm at 25°C)	pH	Remarks
1- 6-66	1900	5.6	5.2	0.7	1.5	1.4	4	16	1.90	0.3	16	63	6.1	Rain all day, 0.4 in., ended before sample collection.
2-12-66	2100	2.7	4.8	1.4	1.4		3	16	1.60	.10	18	53	5.8	Snowmelt, after 3 mild days; ground frozen.
2-13-66	1410	2.0	4.6	1.3	1.6		3	15	1.75	.35	17	52	5.8	Raining all day, plus continued snowmelt; about 60 percent snow cover remaining.
2-13-66	a/1420	2.4	5.8	1.1	2.1		4	18	1.40	.15	19	56	6.0	Do.
3- 1-66	a/0715	3.6	5.9	.8	1.6		4	16	1.50	.10	18	54	6.1	Light rain previous 24 hrs, 0.4 in., ended before sample collection, plus snowmelt; about 60 percent snow cover remaining; ground frozen.
3- 3-66	a/1800	--	--	--	--	--	--	--	--	--	--	52	6.2	Snowmelt, after several mild days, snow nearly gone; flow 2 gpm.
3- 5-66	a/1400	--	5.6	1.9	0(?)		3	12	1.4	.2	22	53	6.2	Rain previous 24 hrs, 0.5 in., ended before sample collection, snow gone; soil thawing.
3-13-66	a/0830	--	--	--	--	--	--	--	--	--	--	57	6.2	Light rain previous 24 hrs, 0.5 in., ended before sample collection, soil not frozen; no flow 24 hrs previously, now 3 gpm.
3-30-66	a/1830	--	--	--	--	--	--	--	--	--	--	59	6.5	Light showers and slight snowmelt 3-30-66 augmented continuing flow.
4-10-66	a/1530	--	--	--	--	--	--	--	--	--	--	59	6.5	No significant rain since light showers 4-1-66; flow 0.5 gpm.
4-23-66	2200	--	7.5	3.0	0(?)		7	22	1.1	.5	31	71	6.1	Raining hard, started at 1600 hrs; only previous rain this month was about 0.15 in. on 4-20 and 4-21-66. No flow here 4-16-66. Water somewhat turbid; decanted sample immediately after collection to remove most sediment.
5- 5-66	0830	--	5.6	2.2	1.1		7	18	1.2	.0	23	58	6.5	No significant rain since 4-30-66.
5-12-66	1900	--	--	--	--	--	--	--	--	--	--	53	--	Light rain previous 12 hrs augmented continuing flow.
5-27-66	0815	6.1	7.8	1.9	2.2	1.0	20	14	1.15	.20	28	72	6.9	No rain since 5-21-66; no significant rain since 5-19-66; flow 0.1 gpm.
5-28-66	2130	1.1	10	2.8	1.9	2.3	13	26	1.60	3.70	36	101	6.6	Collected sample during brief thundershower, 0.2 in.; water turbid.
6-10-66	0815	--	--	--	--	--	--	--	--	--	--	52	5.95	Heavy rain previous 12 hrs, 2.5 in., ended before sample collection; no flow 12 hrs previously.
8-16-66	1800	--	3.1	.8	2.3		5	8.5	1.5	.8	10	36	5.8	Heavy showers previous 6 hrs, 1.6 in., ended before sample collection. About 0.45 in. on 8-14 and a little on 8-9-66, otherwise none since 8-2-66.
11-10-66	2245	--	4.6	1.3	2.5		9	14	.0	.8	17	56	6.8	Very light rain 11-7 to 11-9-66; heavy shower (0.7 in.) 11-10-66; no flow here for weeks previously.
11-28-66	2100	--	--	--	--	--	--	--	--	--	--	55	--	Heavy rain since 1500 hrs, ground not frozen.
12-17-66	1600	--	--	--	--	--	--	--	--	--	--	61	--	Snowmelt; ground not frozen.
1- 8-67	1600	--	--	--	--	--	--	17	--	--	--	55	--	Snowmelt over past 30 hrs, snow cover 95 percent.
3-12-67	1900	--	--	--	--	--	--	--	--	--	--	53	--	Snowmelt over past 2 days; little cover remaining. Snow fell chiefly from 3-5 to 3-8-67.
6-11-68	1700	1.4	4.8	1.1	.5	2.5	7	8.8	.8	4.3	16	51	5.7	Collected sample 15 min after start of heavy shower, water turbid; no flow previous to shower; no major storms since 6-1-68.
6-11-68	2200	--	--	--	--	--	--	--	--	--	--	51	--	Collected sample 3 hrs after end of shower; 1.5 in. in 2 hrs.
6-15-68	1800	--	--	--	--	--	--	--	--	--	--	57	--	Showers from 6-11 to 6-13-68; no rain 6-14 or 6-15-68 before 1800 hrs.
9- 6-68	0800	--	2.2	.6	.4	2.1	6	6.5	1.8	.3	8	34	6.0	NH_4 0.00. Light rain started 2200 hrs, 9-5-68; heavy rain before 0600, 9-6-68; water slightly cloudy. No flow previously for several weeks; last rain 9-2-68.

a/Sample collected from grassy, leafy ditch along Murphy Road, 800 ft. upslope from primary site.

D2.--Apparent overland runoff and shallow ground-water discharge at scattered sites in the Susquehanna River basin
(Chemical constituents and hardness in milligrams per liter; analyses by U.S. Geological Survey, Albany, N.Y.)

Location: Latitude ° ' "	Location: Longitude ° ' "	Date	Time (24-hour)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na) + Potassium (K) as Na (calculated)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Hardness (Ca, Mg) (as $CaCO_3$)	Specific conductance (micromhos per cm at 25°C)	pH	Remarks
42 02 46	76 18 53	March 1, 1966	0900	3.5	2.6	1.6	1.8	3	12	1.50	0.15	13	41	6.1	Brushy field; flow across grass, no channel; snow cover 40 percent.
42 02 07	76 19 24	March 5, 1966	1530	--	4.6	1.8	.5	4	14	1.7	.3	19	54	6.1	Steep slope, conifer woods; flow across leaves, no channel.
42 02 47	76 39 13	March 2, 1966	1045	5.4	4.3	1.8	3.7	6	18	1.90	.05	18	57	6.6	Woods; flow in ephemeral rill, standing water and snow upslope.
42 02 46	76 39 15	March 5, 1966	1830	--	5.1	2.1	2.8	7	18	2.0	.1	21	53	6.3	Woods.
42 03 44	76 39 19	March 5, 1966	1800	--	5.6	2.2	1.4	2	21	1.8	.2	23	65	5.2	Pine woods with snow patches upslope; flow through holes in soil.
42 03 48	76 39 59	March 31, 1966	1245	--	5.2	1.66	3.4	6.0	14	5.6	.06	20	67	6.6	Brushy field, gentle slope; shallow pools and slow flow through grass.
42 04 50	77 04 02	March 2, 1966	1300	2.6	5.4	1.1	.9	8	12	.90	.05	18	46	6.5	Brushy field; no channel; snow cover 15 percent.
42 04 06	77 24 37	April 1, 1966	1145	--	8.9	1.40	1.6	9.0	21	1.50	.09	28	75	6.5	Woods; flow est. 0.004 cfs in wheel ruts; no snow cover or recent rain; probably shallow ground-water discharge.
42 04 56	77 28 18	March 2, 1966	1445	2.9	4.6	1.6	2.8	8	15	1.35	.05	18	53	6.4	Brushy field, flow est. 0.01 cfs in wheel ruts; snow cover 30 percent.
42 20 58	75 30 14	March 3, 1966	--	3.7	16	2.4	1.8	22	25	5.9	1.70	50	121	6.7	May include some ground water.
42 20 38	75 53 57	Feb. 14, 1966	0945	4.7	2.9	1.0	1.2	4	8.8	1.20	.00	11	33	6.8	Woods and fields; flow est. 0.05 cfs in ephemeral rill; snow cover near 100 percent.
42 22 29	76 17 16	Feb. 14, 1966	1115	3.6	4.1	1.0	1.6	8	9.6	.80	.00	14	39	6.6	Flow est. 0.02 cfs across grass and in very shallow ditch.
42 22 53	76 38 29	Feb. 14, 1966	1355	4.2	20	4.1	1.8	61	17	2.05	.60	67	145	7.2	Flow est. more than 0.02 cfs across leaves in swale; no channel.
42 22 03	77 48 52	March 2, 1966	1705	3.1	7.0	1.1	1.6	12	14	.90	.10	22	57	6.7	Dense brush; flow in ephemeral rill across grassy surface.
42 36 36	74 45 10	March 2, 1966	--	3.8	8.3	1.3	1.8	13	14	3.60	.35	26	68	7.0	--
42 37 49	75 09 57	March 2, 1966	--	3.1	3.4	.1	1.6	4	8.9	.50	.00	9	30	6.5	--
42 37+	75 30+	March 2, 1966	--	5.2	13	2.3	5.3	26	19	4.65	7.0	42	122	6.8	--
42 52 45	75 15 46	March 2, 1966	--	3.1	78	4.7	2.3	210	23	5.3	19	214	422	7.4	Hillside pasture.
42 05 18	75 54 57	March 5, 1966	1430	--	12	3.4	26.5	26	22	40	.5	44	229	6.4	Park Creek; basin partly suburban. a/
42 04 32	77 22 46	April 1, 1966	1210	--	19	3.19	8.3	50	22	10	.60	61	165	7.2	Tuscarora Creek; basin largely agricultural; probably high base flow. a/

a/ Samples from perennial streams draining several square miles; not used in compiling table 9.

D3.--Springs and small streams in Pumpelly Creek basin

(Chemical constituents, dissolved solids, and hardness in milligrams per liter; analyses by U.S. Geological Survey, Albany, N.Y.)

Location: Latitude ° ' "	Location: Longitude ° ' "	Date	Time (24-hour)	Silica (SiO_2)	Total iron[a] (Fe)	Total manganese[a] (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids: Sum	Dissolved solids: Residue at 180°C	Hardness (Ca, Mg) (as $CaCO_3$)	Specific conductance (micromhos per cm at 25°C)	pH	Remarks
42 05 12	76 15 54	June 9, 1967	1330	8.1	0.02	0.05	5.2	1.5	2.1	0.4	9	15	2.0	0.0	0.0	39	52	19	57	7.0	Spring; water issues in many places near top of bedrock cliff.
42 03 40	76 14 39	June 22, 1967	1520	5.8	.12	.03	5.3	1.8	1.8	.7	12	14	1.2	.0	.0	36	51	20	58	6.8	Spring; temperature 8°C.
42 05 11	76 15 04	June 8, 1967	1530	7.7	.54	.06	13	3.4	5.2	.7	32	26	3.7	.0	1.9	78	89	46	128	7.1	Spring; temperature 10.4°C.
42 04 40	76 15 44	June 9, 1967	1100	7.3	.96	.05	11	4.4	9.5	1.0	16	22	20	.0	3.9	87	115	46	158	6.9	Spring; temperature 7.7°C.
42 04 28	76 14 29	June 9, 1967	1600	8.7	.05	.05	20	8.1	12	1.8	20	22	44	.0	13	139	189	84	256	6.9	Spring; water issues in many places from bedrock 5 feet above stream.
42 02 20	76 14 10	June 15, 1967	1100	5.3	.58	.12	4.2	1.8	1.9	.5	9	14	.0	.0	.1	32	41	18	49	6.8	Flow through mole runs and across grass, no permanent channel, temperature 16°C.
42 01 50	76 14 35	June 22, 1967	1855	6.0	.36	.04	9.0	2.9	3.8	1.2	32	15	2.7	.0	.0	57	70	34	94	7.1	Pumpelly Creek; temperature 18°C.
42 05 21	76 16 02	June 22, 1967	1930	4.6	.15	.03	13	3.4	4.3	1.6	42	17	5.1	.0	.0	70	87	46	122	7.2	Pumpelly Creek, U.S. Geol. Survey Station 01-5138.40.
42 04 23	76 14 02	June 22, 1967	1910	4.1	5.8	.16	18	5.0	3.0	1.6	66	17	1.1	.0	.5	82	111	66	149	7.2	No flow here June 8; last rain June 18; water cloudy.
42 03 05	76 14 46	June 15, 1967	1800	4.3	.64	.07	19	5.8	5.2	1.3	76	12	4.0	.0	.4	89	114	72	166	7.5	Pastures and small swamps upstream.
42 05 21	76 16 00	June 10, 1966	0915	--	--	--	9.7	2.6	--	--	25	17	3.0	--	1.35	--	--	35	98	7.0	Pumpelly Cr ; high flow, somewhat turbid. Not used in compiling table 10.

a/ Samples acidified, not filtered.

New York State Department of Environmental Conservation